SEPTEMBER 1977 75 CENTS

Popular Mechanics

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PM tests the new turbos: '78 Buick V6 and Saab 99

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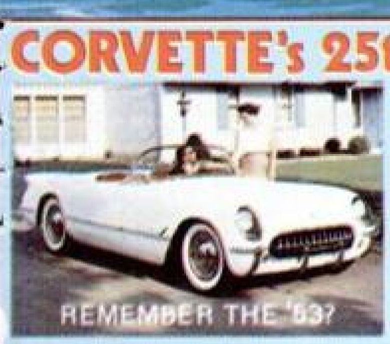
- Do a no-fail paint job in any climate

NOW: We can save lives in a Towering Inferno

CORVETTE's 25th YEAR: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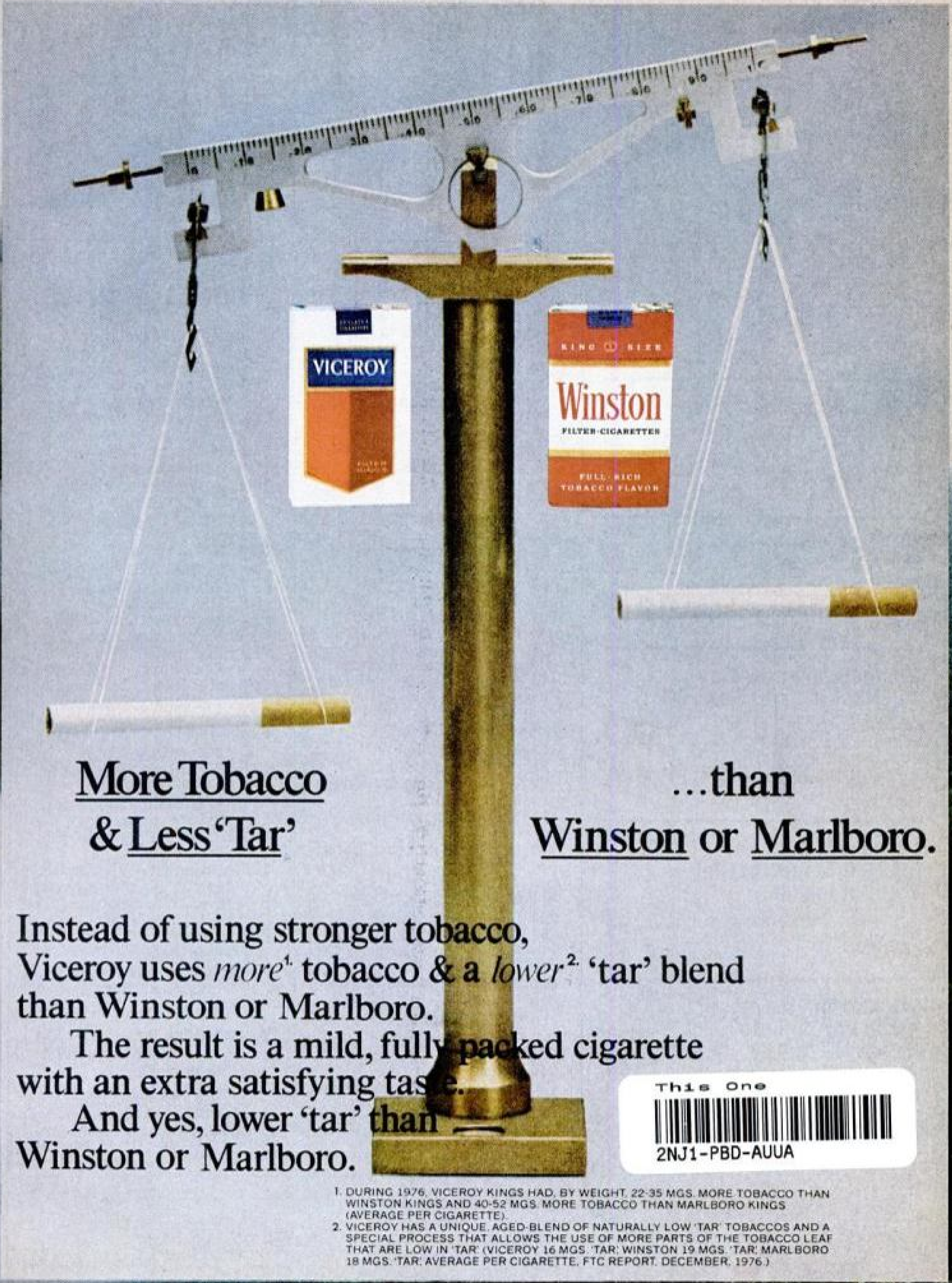

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On the cover

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—*Painting by Ed Valigursky*

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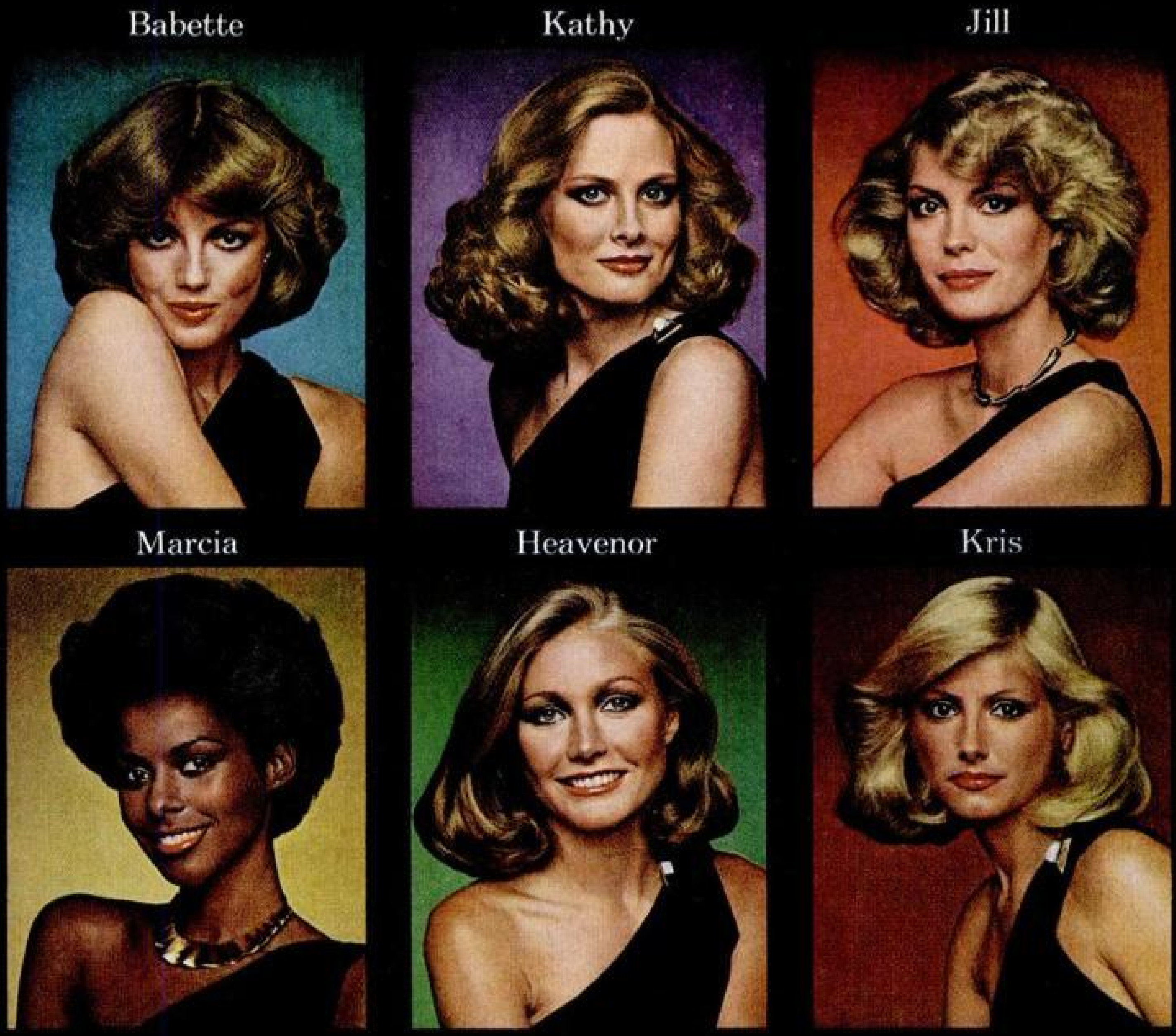

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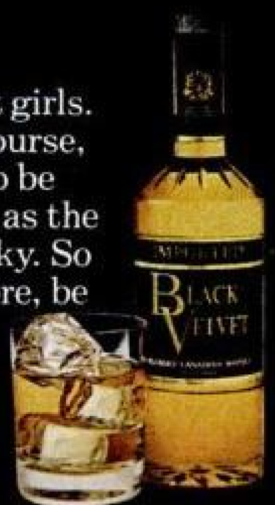

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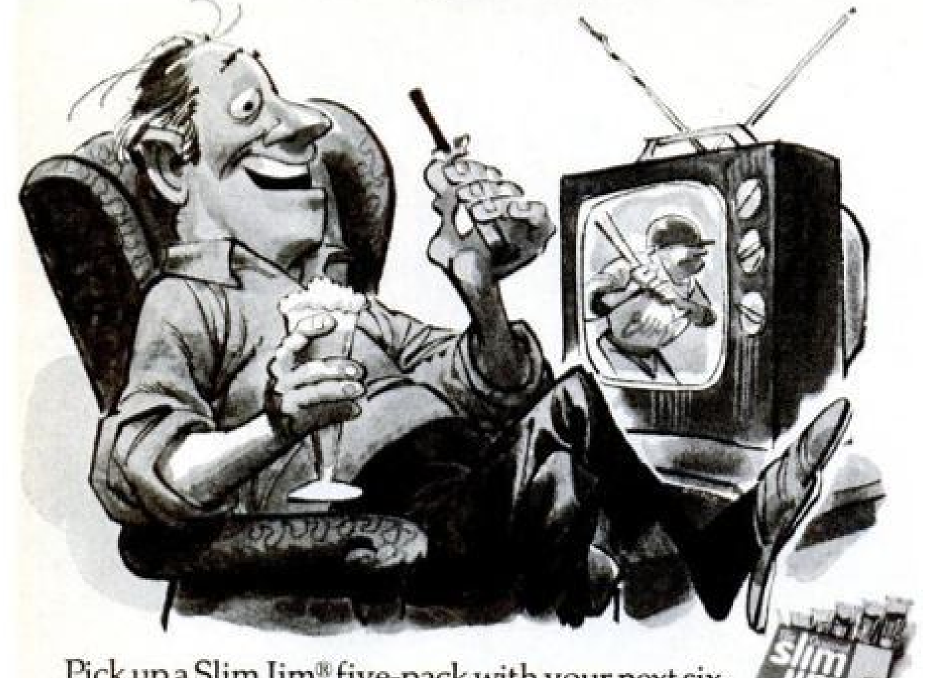

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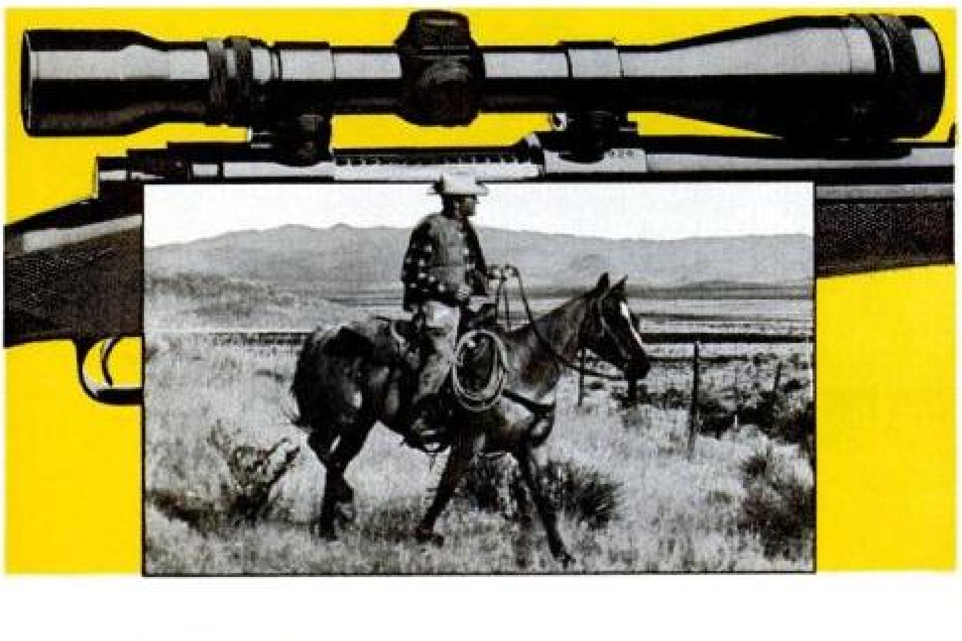

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New Ford F~250. For '77, our toughest 4x4 by far.

Ford's F-250 is new and it's tough. In fact, it's the toughest four-wheeler we build.

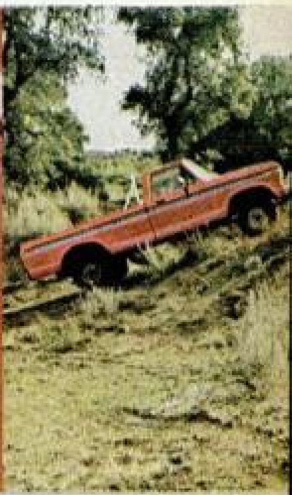
The F-250 is called a ¾-ton pickup, but it's rated to carry a maximum payload of almost two tons (3,665 lbs., to be exact). Its strong new frame delivers a whopping 8400-lb. maximum GVWR.

But the new F-250 is more than just tough. It has more than a dozen important new features in all. Like standard integral power steering. A turning radius that's been reduced by 12%. A new easier entrance height. And more transfer case clearance than before.

And like all Ford 4x4 s, the new F-250 (shown with and without owner-added roll bar, fog lamps and brush guard) has important features like:

- The choice of either part-time or full-time four-wheel drive with V-8 automatic.
- Two new optional big-cube V-8's—a 351 and 400.
- A full lineup of engines that run on any kind of gas.

Ford's new F-250 4x4. Off-road tough, with the muscle to get you there and back.



LETTERS TO THE EDITOR

Lunar power?

Several questions came to mind regarding your interesting article, *Energy From Outer Space* (page 98, June '77). Would the microwave beam have any genetic effect on animals or plants? Would it change weather patterns, causing droughts, storms, hot or cold extremes?

If these problems don't come up, wouldn't it be better to mine the lunar surface for the steel that's needed? This would lead to international cooperation on a vast scale and give companies a foothold on the moon for later expansion of orbital and lunar-based factories. Such factories would take the environmental pressures off Earth and reduce power requirements, making the powersats more efficient.

MARK KUMA
(ADDRESS NOT GIVEN)

Scientists working on powersat concepts insist that: 1. There would be no microwave radiation beyond tolerable limits under rectennas. Virtually all the energy would be absorbed by them. Land beneath could be used for farming. 2. There is no evidence to indicate that concentrated microwave beams would have a noticeable effect on ozone or weather in any way (nor evidence to the contrary). 3. Mining the lunar surface, an interesting idea, is under consideration by several scientists. Powersat people, however, are shooting for earlier target dates than possible if the hardware and detailed technology for moon mining had first to be developed.

I read the proposal about satellites beaming power to Earth. This may seem obviously foolish, but why not use the moon for a solar base and beam power to Earth from there? The moon is 10 times as far away as the proposed manmade satellites, and would be able to collect many times the energy.

LOREN WOODRUN
CHESTER, ILL.

The advantage of using satellites is that they can be put into "synchronous orbit," which means they remain exactly overhead at any desired locations to beam power to fixed receiving stations on Earth. This would not be the case with the moon, constantly changing its position relative to Earth.

Car cost cutter

I really enjoyed your article *Car Ownership: How to Take the Low-Cost Road* (page 128, May '77). I am attending a college where, if a person uses common sense, he is looked upon as an idiot. Your article was full of common sense, which I was glad to see some people still have. You pointed out that by taking care of a car it can be made to last, which saves money, too. Your suggestions were really helpful. Keep up those common sense articles.

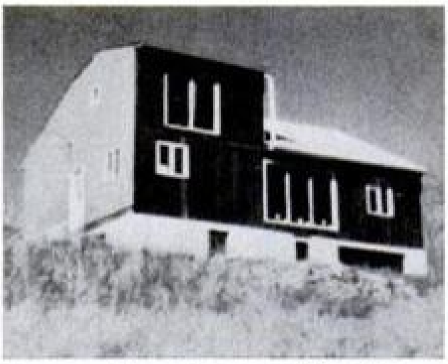
DANIEL HARBOUR
ANGWIN, CALIF.

House in PM goes solar

I have built many PM projects, and am completing my largest undertaking. You carried plans for a vacation home (page 77, May '72). I liked the design and decided to build the house over a five-year period. This is the last year. We will finish our project this fall, and it will be our permanent dwelling. I insulated it with care—because my next project is a solar furnace to help heat it.

LOUIS B. GUMP
WASHINGTON, PA.

The house was one of several vacation homes featured in that issue. Plans for four PM houses are listed



Permanent home from vacation plan.

in our plans catalog, available for 50 cents in check or stamps to Popular Mechanics, Box 1014, Radio City Station, New York, N.Y. 10019.

Cats and lugs

For years I farmed with Cletrac Crawler tractors, which operated on about half the fuel used by modern wheel tractors. They laid down a track and rode on it. Tracks don't pack soil. I placed an egg two inches below ground surface in a plowed field, drove the crawler over it and the egg did not break. This type of tractor did not need all the complicated axles, differentials and related joints in the new "wonders" that keep popping up in your magazine. Why weren't these tractors kept in production?

In wet field conditions I was out much sooner than other farmers,

Reader Nolte's go-anywhere tractor.

and worked wet mud and snow right into the Minnesota fall. Needless to say, I never had a flat tire and several times pulled fellow farmers' wheel tractors out of muddy fields.

PAUL L. NOLTE
FAIRMONT, MONT.

Except in wheat country, the "cats" were too rough on rows, dusty, slow and got to be too expensive. A few still are made. The Struck Co. in Cedarburg, Wis., makes up kits and plans for small tracked-bogie units you can build.

Energyless glossy prints

Your hint on ferrotyping glossy photos (page 196, April '77) was good. However, Eastman Kodak Co. has an even better one for the amateur photographer.

"Kodabrome photographic paper is the same as Kodabromide in speed, contrast, etc., but it has resin-coated backing that permits normal development of one and a half minutes, two minutes fixing, four minutes washing, and approximately 15 minutes to air dry to perfect gloss."

Think of the energy saved by not using a dryer, plus time and effort saved in blotting and rolling flat. Hope this may help some amateur to a more pleasant darkroom time.

ALFRED DANIEL
JACKSON, MISS.

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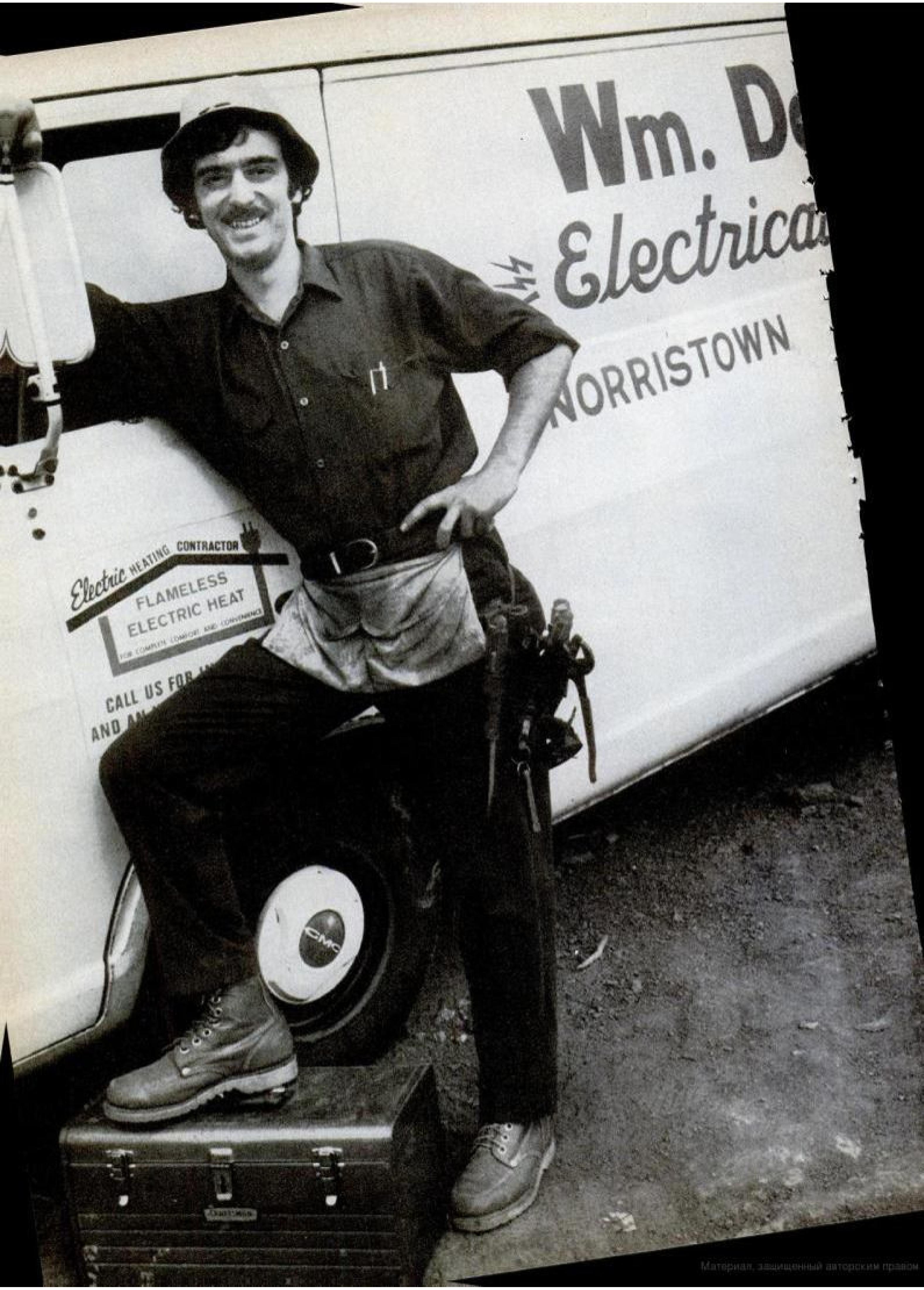

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"Learn an honest trade," *my old man used to say to me,* "and you'll never have to knuckle under to any man."

(A TRUE STORY)

Bill De Medio of Conshohocken, Pa., has it made. At 26, he's an electrician. The top of a trade where there aren't enough good men to go around.

But more important, Bill's his own boss and calls his own shots. "I just went into my own business. And even before the sign on my truck was dry, I got my first big job.

"The contractor for a new group of houses asked me to do the wiring. And there's bound to be more work from him and other builders.

"If it wasn't for my ICS training as an electrician, I'd still be in some dead-end job—hating what I was doing, taking orders from everyone, and never getting any thanks for it.

"As an electrician, you're the boss on the job—even when you're working for someone. You get respect, good money, and like my old man said, you don't have to take baloney from anyone."

Bill De Medio is one of our outstanding graduates. He's hard working. He's in a growing field. And he has good training.

Of course, we can't promise you'll be as successful as Bill—no school can guarantee jobs for its graduates. But ICS *can* give you the first-rate training you need—especially if you're interested in one of the growing careers where ICS concentrates its training.

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Remember, it's your life. You might as well make the most of it.

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At 26, Bill De Medio has more freedom, more security, and gets more respect than guys twice his age. (Photograph by Frank Cowan.)

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APPLIANCE CLINIC
QUESTIONS ANSWERED BY PAUL MANN

Danger: thermoactinomycetes

The observation made in the March Appliance Clinic *("Danger in the pan") by James Clarke regarding the possibility of thermoactinomycetes spores in drip pans of frost-free refrigerators startled me. I wonder how many people are as unaware of this as I was. I can't help but wonder if the danger applies to other appliances.—Mrs. Kathleen Cook, Belleville, Mich.*

According to the Association of Home Appliance Manufacturers, the thermoactinomycetes microorganism can "thrive in any warm, moist rich environment. The problem is by no means limited to drip pans.

"Inadequately cleaned airconditioning and humidity control equipment in buildings and homes have been involved in approximately a dozen cases reported by medical authorities. Concentrations of the microorganisms have also been found in bathrooms, pools, rugs and carpeting, telephone mouthpieces and ordinary soil."

AHAM points out that diagnosis is difficult, because symptoms are similar to those for pneumonia and asthma. Some authorities say symptoms resemble the early stages of emphysema. The association cautions that manufacturer's instructions for the use and operation of all appliances should be read, understood and carefully followed.

Feedback

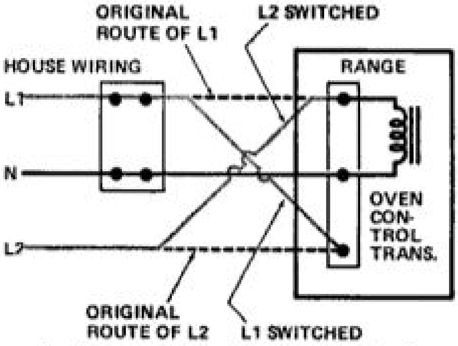
In March's *Appliance Clinic* Herbert Mann asked a question concerning his General Electric Americana electric range (Model J-795). He complained that the heating element cycled on and off, causing house lights to flicker after the element had heated to the temperature set on the control. We advised that the responder (sensor) was probably at fault and should be replaced.

Some of our readers have suggested other solutions. *Caution: Turn off the current to the range at the house service panel before trying any of these suggestions.*

■ John Goetz of Cumberland, Md., suggests you switch the feed lines at the range terminal block. Reverse L1 and L2 leads as in the drawing. John says the problem occurs because of interference on the feed line, which upsets the sensor. John emphasizes that if the sensor is replaced you should have the unit recalibrated by a "qualified serviceman."

■ Jerry Rielly of Speedwell, Va., suggests that an electrician be called to check house wiring. We suggest you first have the utility company check to see that the incoming service to the house is the proper size. If it is correct, then contact the electrician to check the wiring.

■ Joseph J. Hansen's solution from Lexington, Mass., involves the temperature limit switch clamped



Position change of L1 and L2 leads

to one leg of the calrod bake element.

"A common problem with this switch is that oven insulation can get packed around it, causing it to operate at too low an oven temperature," he says. He suggests that the back be removed from the range and the insulation be pushed away from the switch.

Note: GE ranges from 1971 onward have a guard around the temperature limit switch that would seem to preclude this possibility.

Thank you, gentlemen.

Blown away

In the year since I bought my Frigidaire Custom Imperial refrigerator with frostless top freezer compartment it has blown two blower motors—the motor that blows air through the freezer compartment. The third one is now three months old, and I'm waiting for it to quit, too. When the motor stops, the temperature in the freezer soars to 50° F. and food thaws. Is this a poorly manufactured motor or what?—Jerry Doffing, Hastings, Minn.

No, the motor isn't poorly manufactured, but it does not have an overload switch, which could be a significant factor. In rural areas (my map tells me that Hastings is rural) voltage surges are common. I think that surging is doing the damage.

If I were you, I would buy a device from a General Electric distributor called a voltage spike protector. Plug it in as directed. It prevents equipment damage when voltage surges occur.

Now if the blower motor quits again, the fact that a serious problem exists in the wiring system of the refrigerator is confirmed. Get in touch with the company and have them handle the problem. Work should be covered by your manufacturer's warranty.

Pump action

Could you please advise me if there is some way of preparing an automatic washing machine for long periods of inactivity? The machine is often inoperative for three to four months at a time. I have just paid $60 for a new pump assembly for my General Electric washer which is not that old. The pump started leaking. The man said the seals had "dried out."—John T. Allen, St. Petersburg, Fla.

First of all let me caution readers who own Hotpoint clothes washers that Mr. Allen's problem and yours are different. Hotpoint had a problem with defective pump sealing. There is a pump kit available from a Hotpoint dealer to rectify the condition and prevent leaking. GE washers do not have this problem.

It is possible for a washing machine's pump seals to dry out and begin leaking if the machine is kept inactive for long periods. To help prevent this, keep some water in the tub during the period of inactivity—¼ to ½ in. is ample.

There are other reasons why pump seals can leak: One is age, another is wear. A third is getting a small article of clothing trapped in the pump. ★★★

If you have a question about any appliance, send it to Appliance Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Sorry, but letters cannot be answered individually. Problems of wide interest will be discussed in this column.

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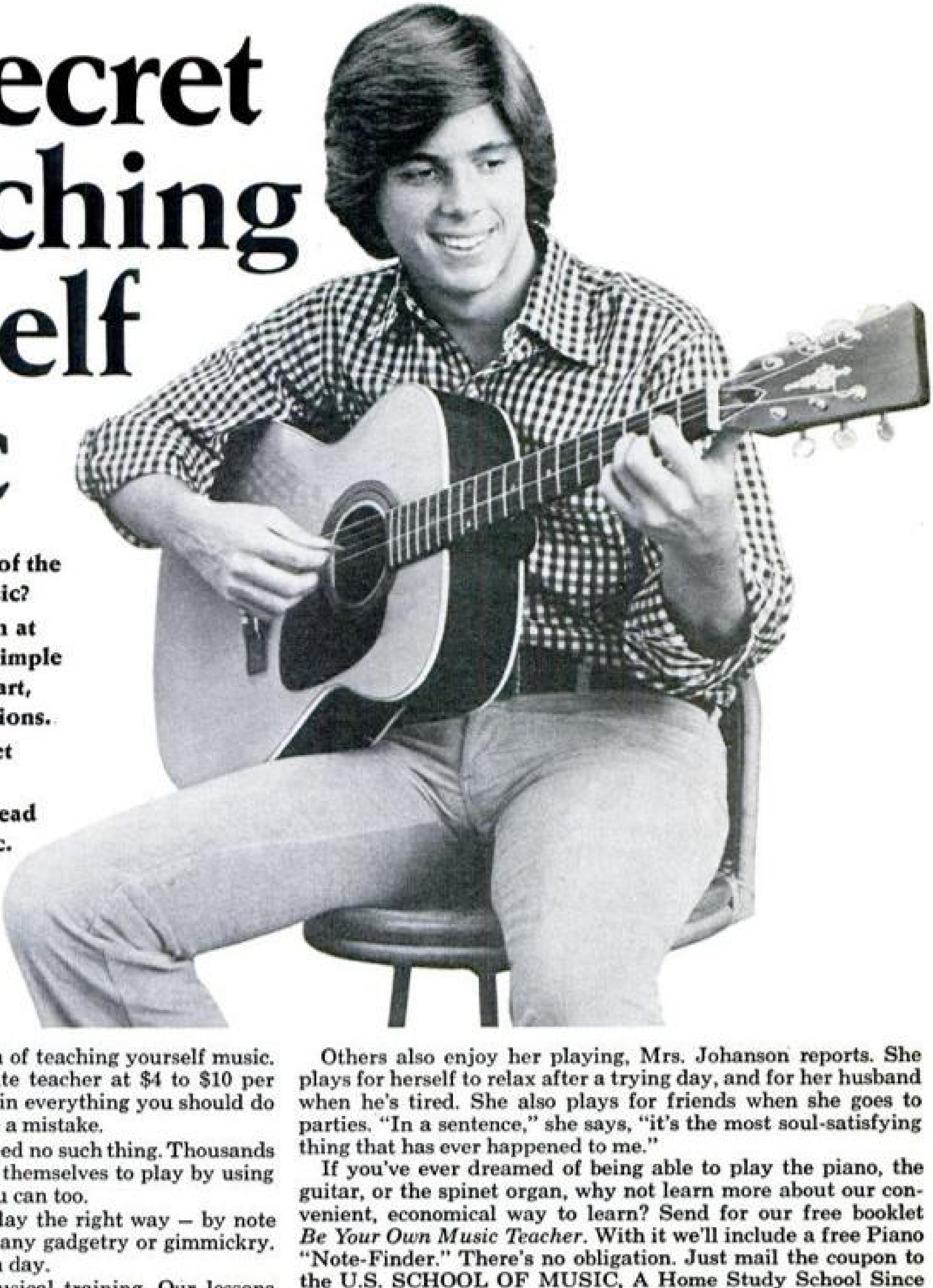
The secret of teaching yourself music



Why keep depriving yourself of the thrill of making your own music?

Here's a pleasant way to learn at home in spare time. You play simple familiar tunes right from the start, then more advanced compositions.

Choose piano, guitar or spinet organ.

No gimmicks—you learn to read notes, play regular sheet music.

It really works! Thousands now play who never could.

It may seem odd at first – the idea of teaching yourself music. You might think you need a private teacher at $4 to $10 per hour to stand beside you and explain everything you should do – and to tell you when you've made a mistake.

But surprising as it seems, you need no such thing. Thousands of people just like you have taught themselves to play by using the lessons we give by mail. And you can too.

With our lessons, you learn to play the right way – by note from regular sheet music. Without any gadgetry or gimmickry. And all it costs you is just pennies a day.

You don't need any previous musical training. Our lessons start you off "from scratch" with clear word-and-picture instructions. A lot of the songs you practice first are simple tunes you've heard many times. And since you already know how these tunes are supposed to sound, you can tell immediately when you've "got them right."

Then you go on to more advanced pieces. By this time you can tell if your notes and timing are right, even without ever having heard the songs before. Sooner than you might think possible, you'll be able to play whatever kind of music you like. Folk. Popular. Classical. Show and dance tunes. Hymns.

You learn in your spare time, in the privacy and comfort of your own home. There's no one standing over you to make you nervous. And because you teach yourself, you can set your own pace. You're free to spend as much time mastering any lesson as you wish.

It's really a marvelous way to learn. As recent graduate Mrs. Norman Johanson wrote us, "My daughter has taken lessons for 8 years from a private teacher, and now she asks *me* questions about some of her lessons. How very proud I feel when she says to friends, 'You've just got to hear my Mom play!'"

Others also enjoy her playing, Mrs. Johanson reports. She plays for herself to relax after a trying day, and for her husband when he's tired. She also plays for friends when she goes to parties. "In a sentence," she says, "it's the most soul-satisfying thing that has ever happened to me."

If you've ever dreamed of being able to play the piano, the guitar, or the spinet organ, why not learn more about our convenient, economical way to learn? Send for our free booklet *Be Your Own Music Teacher*. With it we'll include a free Piano "Note-Finder." There's no obligation. Just mail the coupon to the U.S. SCHOOL OF MUSIC, A Home Study School Since 1898. 417 South Dearborn Street, Chicago, Illinois 60605

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Mini-cup

America's Cup 12-meter yachts cost over $1,000,000 each to build and campaign, and they measure about 60 feet in length.

Just before their final contest begins off Newport, R.I., on Sept. 13, a less expensive regatta will be held in Newport for 12-meter yachts that measure 60 *inches*. Twelve American skippers are expected to take part in elimination trials on Sept. 8 and 9 to pick a defender of the Mini-America's Cup "Silver Bucket." Challengers from Australia and England will be narrowed down to one race against the U.S. finalist to be held on Sept. 10 and 11.

Like their offshore counterparts, Mini-cup sailors will have their hands full. Helmsmen standing along the shore of the Fort Adams-Newport Harbor course will probably use left-hand radio controls to trim the mainsail and jib of their models and a right-hand control on another frequency for the rudder.

Sponsors for the Mini-America's Cup are the Newport International Sailboat Show, the Hobby Industry Assn. of America and the American Model Yachting Assn. Details of the model regatta are available from Rich Palmer of the Hobby Industry Assn, 319 East 54th St., Elmwood Park, N.J.

Raptors return

Once reserved exclusively for royal falconry and more recently threatened with extinction by DDT pollution, the peregrine falcon may not disappear after all. In another of his environmentally enlightened moves, Interior Secretary Cecil Andrus has directed an attempt to reintroduce the endangered falcons into Idaho's Snake River Birds of Prey Natural Area. Young peregrines hatched at the Cornell Laboratory of Ornithology at Fort Collins, Colo., have been placed in nests of prairie falcons in the Snake River preserve.

If the prairie falcons accept and raise them, the young peregrines may be able to adapt to the area and increase the 53 known wild pairs in the United States south of Alaska. The unusual Snake River Birds of Prey Natural Area, established in 1971 for the protection of raptors, now supports prairie falcons, golden eagles, various hawks and owls, and now, hopefully, the bird of the days of falconry, the peregrine.

Prehunting

Before the fall hunting season starts across the country, before gun lockers are opened and weapons checked, before youngsters get intrigued and want to handle the remarkable machinery—now is the time to review once more proper firearm safety in the home. Rocky Rohlfing, noted head of the National Shooting Sports Foundaton, points out that it's education that should come before gun handling of any kind. It must be second nature to open the action of any firearm and check to be sure it is unloaded before showing it to anyone. And the person examining the gun should automatically do the same and then continue to point it always away from any person just as if it were loaded.

Children are often clever enough to get the keys to a locked gun cabinet, and it is for that reason, too, that ammunition should be locked up separately from where firearms are stored. Trigger or action locks are also worth considering.

But education in the essentials of gun handling always comes first. For the basics that follow, an excellent pamphlet, *Firearms Safety in the Home*, is available for 25 cents from the National Shooting Sports Foundation, 1075 Post Rd., Riverside, Conn. 06878.

Diesel vs. gas pickups

Up where temperatures can drop to −40° F. in mid-winter, the Maine Dept. of Transportation is running a test on 14 diesel-powered International Terra pickup trucks and 14 gas-engine Terras. The diesels have six-cylinder 198-cu.-in. Nissan engines and are running against four-cylinder 196-cu.-in. IH Comanche gasoline Terras. All the pickups go out on troubleshooting highway patrols, and during snowstorms some operate around the clock several days at a time. Two meters in each truck register hours of engine use and idling time.

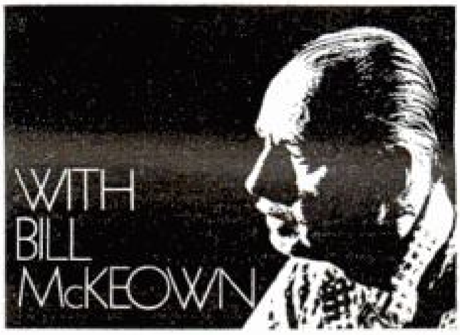
So far the vehicles have been rolling up about 3600 miles per week and statistics are summarized every three months, with the test scheduled to run for four years. With 100,000 miles completed for the approximately equal-horsepower rigs, the diesels are averaging 21.09 miles per gallon compared to 13.9 for gas. "It used to be labor and parts," reports Raymond Vigue, director of Maine's Motor Transport Service, "but now fuel has become the most important cost element in our operation, and requires primary attention and control."

Three ways to climb

For outdoorsmen who want to see the Swiss Alps this fall without the rigors of scaling them, there are easier alternatives. In September and October you can still hike the hills, join bicycle tours that circle Lake Geneva, or take mule safaris through mountains of the Matterhorn country. The bike route of 118 miles takes five days and passes through scenic villages of both Switzerland and France. By mule, riders and hikers cover about 65 miles along mountain trails in seven days at altitudes of 3000 to 8000 feet. Arrangements can be made through Welcome Swiss Tours, 7 Avenue Benjamin Constant, Lausanne 1003, Switzerland.

Protected rivers

A proposal to add all or parts of 20 outstanding free-flowing rivers to our National Wild and Scenic Rivers System has been sent to Congress by the Department of the Interior. Designations would include wild, scenic or recreational rivers or a combinaton of these categories. Among the rivers listed are the Gila, N.M; Green, Utah; Illinois, Ark.; North Fork of the Kern, Calif.; Shenandoah, Va. and W. Va.; Sweetwater, Wyo.; Cacapon, W. Va.; Columbia, Wash.; Gaudalupe, Tex.; John Day, Ore.; Loxahatchee, Fla.; Niobrara, Neb.; Tangipahoa, La. and Miss.; Yellowstone, Wyo. and Mont.; Delta, Alaska; Gulkana, Alaska; Madison, Mont.; Ogeechee, Ga.; Salt, Ariz.; and the Wenatchee, Wash. ★★★



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1977 Browning Auto-5 reduced $25.00 at suggested retail.

No other automatic shotgun has stood the test of time like the Browning Auto-5. Introduced in 1903, the Auto-5 won instant acclaim for being the world's first successful auto-loading shotgun. But it was time — not innovation — that gave the Auto-5 its real reputation... **a Browning A- 5 never quits.**

You can count on three or five certain shots from an A-5, when you need them. A hang-up or malfunction is almost unheard of with an A-5. That reputation was recorded by nearly three million hunters who have carried Browning A-5's through corn fields and duck marshes for 74 years. Hard use and hard abuse wrote the A-5 legend.

Today's Auto-5 benefits from advanced metallurgy and design improvements over 1903's model. It has a full pistol grip to aid gun mounting and control. It has a matted, ventilated rib to preserve the advantage of the famous squared receiver — the A-5 gives you a sharp, clean sight picture. Speed loading lets you load faster than any other auto shotgun. And a magazine cut-off lets you change the load in the chamber without disturbing shells in the magazine.

But like 1903's model, today's A-5 is still sold in duck blinds and corn fields. It's still sold for its workmanship and dependability. And bought by serious hunters who want to be sure of the shotgun they carry. The Browning A-5 is bought by hunters who can't afford a cheaper automatic.

12, 20 or 3" magnum 20 gauge, $374.95, suggested retail
3" magnum 12 gauge, $379.95, suggested retail

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IMPORTS&MOTORSPORTS

Blowers to bloom

Blowing the doors off other four, even six-cylinder cars was too easy—I began taking on heavy Chevies, like V8 Camaros, with surprising results. Drivers who at first smirked at my challenges were astounded that they couldn't lose the weird Saab . . . but the TURBO logo on the

PM photo: Amy Hartford

Turbocharged Saab 99 we tested is a two-door, but engine will be option in three and five-door Wagonbacks also.

car was the giveaway as to why not.

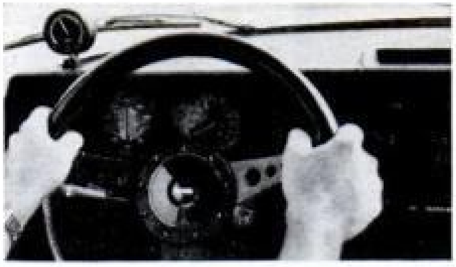
My week at the wheel of a turbocharged Saab 99 was convincing: A safe, roomy, comfortable sedan, powered by a fuel-efficient, four-cylinder engine can perform just as if it had a larger Six or Eight. The secret is an exhaust turbocharger, and cars equipped with it are on the way. Soon your corner garage will be stocking parts like charge-pressure regulators—called waste gates in racing—for your family car.

The Saab Turbo will be on sale late this year, Buick's V6 Turbo next month (see page 40) and more models are in the wings. Porsche's

Turbocharger and plumbing fit in space between radiator and engine.

234-hp Turbo was introduced in '76 (see *Turbocharging Hits the Streets*, page 74, Dec. '75), but that's hardly a family car!

What distinguishes the Saab in this avant garde trio is that it's the first turbocharged, four-cylinder



Turbo gauge (top of dash) indicates pressure in intake manifold.

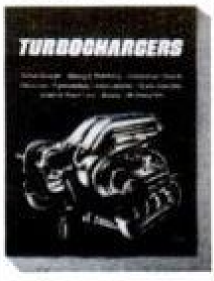
family car you will be able to buy, and it gets the most mpg. (EPA city, 17; highway, 27). I clocked several 0-to-60 times, averaging 9 seconds with the 2600-pound, 135-hp, four-speed sedan. Saab's Four is an in-line ohc, two-liter design with Bosch continuous fuel injection and oxygen sensor/three-way catalyst emission control (see Lambda Sond description, page 57, July '77). To this already smooth powerplant is added a Garrett Ai-Research turbo unit that makes its presence felt at rpm as low as 1500.

You can tell the charging pressure (about 7 p.s.i. max.) the turbo

1978 Saabs have second set of backup lights. They're in front light cluster, surround car with light in reverse.

builds up in the inlet manifold by a dash-mounted gauge, but you needn't monitor it too closely since the system is well protected against overpressurization.

My week of drag racing was fun, but the basic, two-liter, front-wheel-drive Saab for '78 is quick-enough car for me to live with. Turbo-charged, however, it'll be perfect for that guy with the heavy Chevy who's ready for a more rational racer.



Turbo book

A good introduction to turbochargers by the way, is available from H.P. Books, Box 5367, Dept. PM, Tucson, Ariz. 85703. Titled *Turbochargers*, it's $4.95 plus 50 cents shipping.

Turbos on the track

It was nice to see the Renault V6 Turbos bring real excitement to the 24 Hours of LeMans this year—a valiant effort, but the Porsche Turbos did it again. Wonder if that V6 Turbo would fit in LeCar?

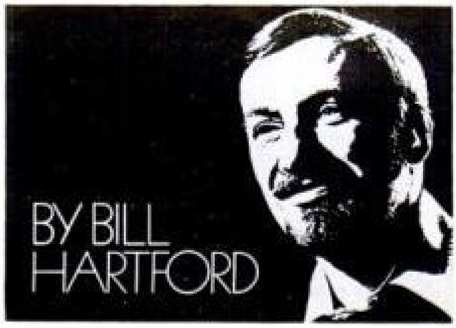
Two-liter turbocharged V6 in Renault Alpine develops a staggering 490 hp.

More than a museum

Did you know Harley-Davidson's first motorcycle was a 1903 model? Gearing up for the marque's 75th anniversary, H-D opened the Rodney C. Gott Harley-Davidson Museum at the AMF York assembly

One exhibit at new museum lets you watch operation of motorcycle brakes.

plant, 1425 Eden Rd., York, Pa. Plant tours will supplement visits to the museum, which features racing films and "show and tell" exhibits to explain principles of mechanics and physics. ★★★



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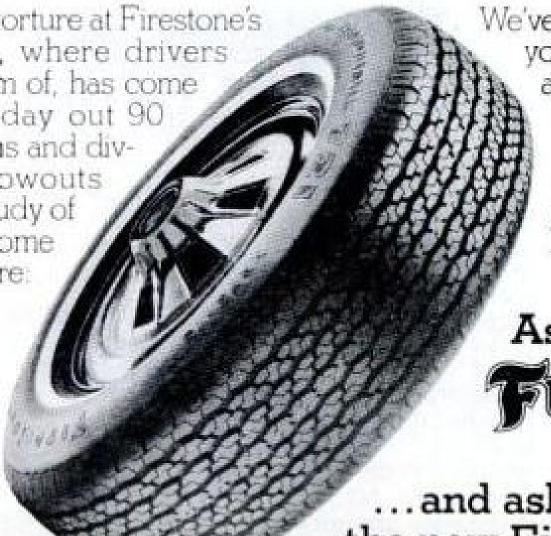

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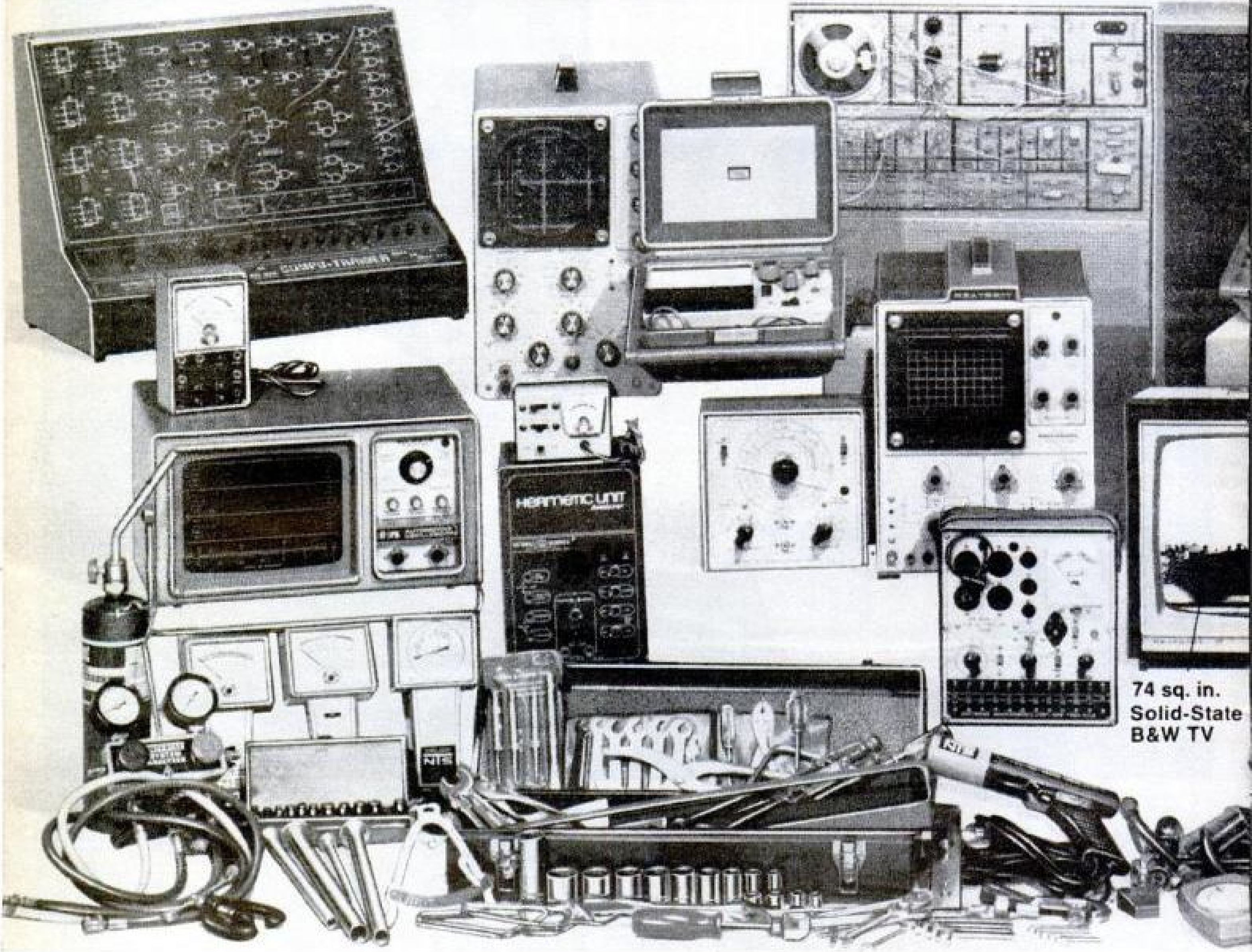

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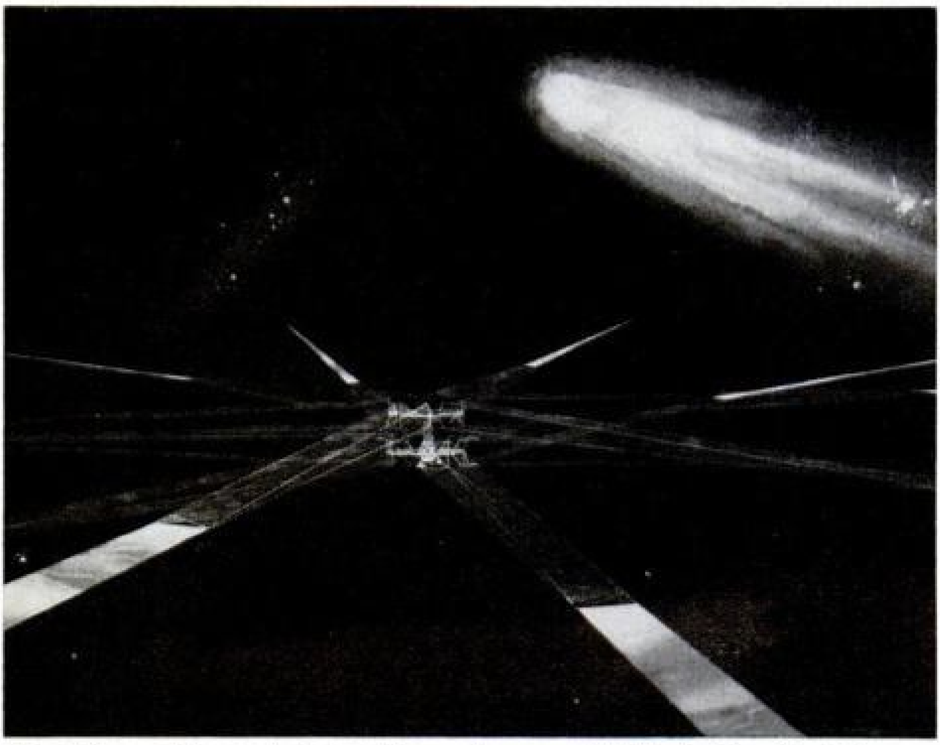


Solar-driven sailing craft designed to rendezvous with Halley's Comet is Heliogyro.

Solar sails in the sunset

The Heliogyro is the latest solar sail configuration off the drawing boards at NASA's Jet Propulsion Laboratory in Pasadena, Calif. JPL scientists regard the solar sail as one of the best ways to achieve long-distance space flight because no fuel is needed. The sail would be pushed by photons—massless particles streaming from the sun that carry energy and have momentum.

The Heliogyro design recently was chosen over a single-sheet, square-sail concept, which was described in detail in *Sailing with Halley's Comet—and Other Space Spectaculars for the 1980s* (page 67, Feb. '77). The "gyro" has 12 sail blades, each 25 feet wide and nearly four miles long. Once deployed, the vehicle spins, creating a centrifugal force that stiffens the blades and keeps them flat. Made of thin but strong plastic, the blades can be pitch-controlled (as on a helicopter) to provide attitude control and to turn the vehicle in relation to the sun. This would allow the thrust of solar pressure to be applied to accelerate or slow down the spacecraft.

A major advantage of the Heliogyro over a square sail is that centrifugal spin would eliminate the need for a stiffening structure for the blades, permitting a lighter, higher-performance vehicle. Scientists theorize that the Heliogyro could carry a heavier payload than the square sail.

Proposed solar sail missions include trips to other planets and a rendezvous with Halley's Comet in 1986. If current plans materialize, in the early 1980s a solar sail will be deployed in a demonstration flight. The launch vehicle, says NASA, will be a Space Shuttle orbiter.

Floating city planned for Tokyo

Within about five years a "floating city" will be built to provide extra space for overcrowded Tokyo. That prediction comes from Columbia University's Dr. Manosobu Shinozuka, an engineering consultant who's working on the project with a Japanese architectural firm. Plans call for a seven-section steel raft measuring about one mile by a quarter of a mile. A likely anchor site is in Tokyo Bay, which has a bottom said to be too muddy for the building of conventional land-fill islands.

"It is also a relatively calm body of water," says Dr. Shinozuka, "so that a floating mass would not be subjected to tremendous waves." Most likely, the structure would be used for shopping malls, warehouses and parks. A bridge or ferry would connect the floating city with the mainland.

Coming: nuclear power from gas

Testing of a nuclear reactor model that uses a gaseous rather than a solid fuel is now under way at the Los Alamos Scientific Laboratory in New Mexico. Designed for space and Earth-based applications, the reactor could operate at temperatures that would melt solid fuel rods, making for greater efficiency and fewer nuclear waste products.

According to NASA, sponsor of the development program, recent research advances indicate that part of the power from a gaseous fuel reactor could be converted into laser beams, offering the prospect of a new generation of space technology. Using this concept, energy from a power station in space might be transmitted by laser beam over long distances to users on space platforms, lunar bases or spaceships.

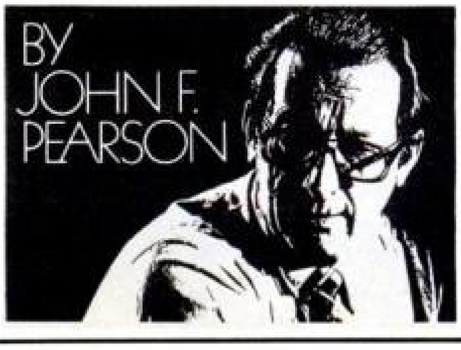
Metric maps for Olympics site

A series of 32 topographic maps of the Lake Placid, N.Y., area—site of the 1980 Winter Olympics—is being prepared by the U.S. Geological Survey to help state officials get ready for the big event. A sign of the times is that the maps will be in metric measurements only (one centimeter on the map equals 250 meters on the ground).

Making life hard for aphids

Chemical alarms used by aphids to signal danger may prove useful in protecting crops from insect damage. Cornell University scientists have recently succeeded in tagging the "warning" chemicals used by the tiny bugs.

According to the scientists, an aphid under attack secretes a chemical that tells his pals to flee. The chemical quickly breaks down, however, allowing the hungry aphids to return to the plant. Now the Cornell researchers have synthesized a stable chemical capable of deterring the insects from returning for an extended period. ★★★



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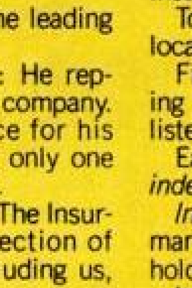

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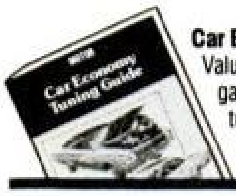
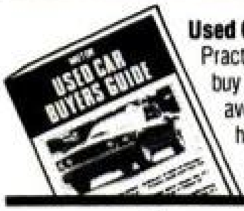
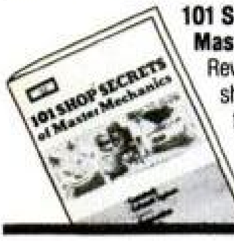


Car Economy Tuning Guide
Valuable tips on how to save gas and money with special tuning, fuel system adjustments, maintenance.

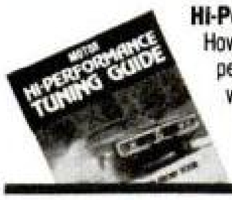


Used Car Buyers Guide
Practical manual tells how to buy a good used car and avoid getting a "lemon." Also, how to get top dollar for your present car.

Auto Problem Solver
Handy glove compartment-sized troubleshooting guide lists 97 common car problems, probable causes, and 433 remedies.



101 Shop Secrets of Master Mechanics
Revealed—"tricks of the trade," short cuts and emergency fix-it tips, including how to seal a radiator on the road and how to make an emergency fan belt.



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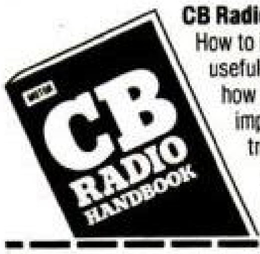

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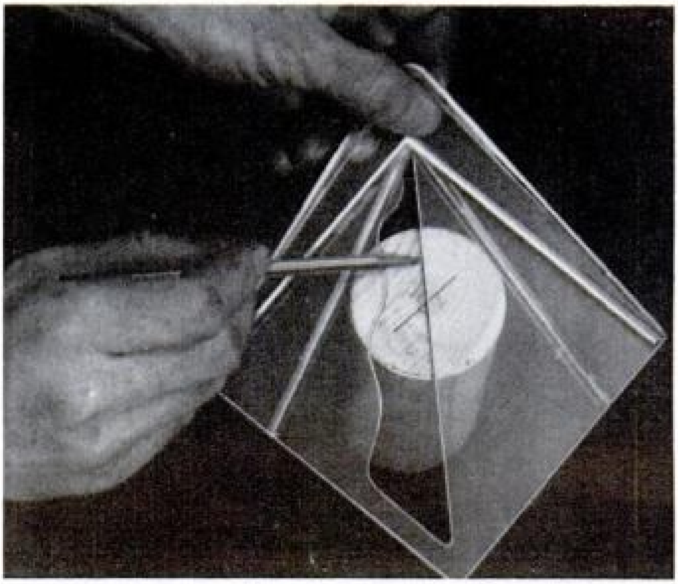
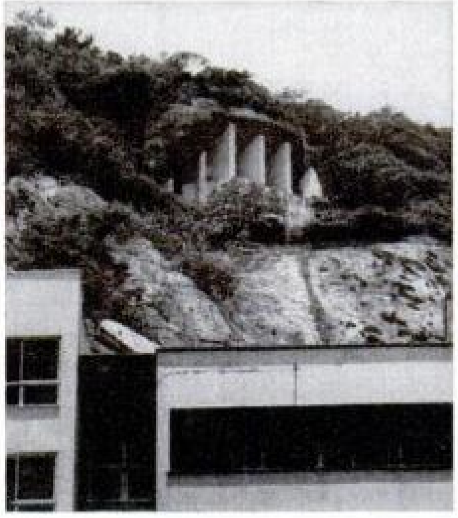


Middle-finder in a jiffy

When you have to find the center of a dowel end, a new plastic gadget called Zero Zero Center Finder does it in seconds. It also pinpoints the center of octagonal, hexagonal and square ends for turning in lathes or other purposes. It's used by wedging it against the piece, marking as shown, turning and marking again. $2.95. Athens Fabricating, 282 Southview, Athens, Ga. 30601.

Jimmy Carter Mountain

Concrete pillars built to hold up an overhanging rock ledge and keep it from falling on Rio de Janeiro buildings resemble a large row of teeth from below. The curious structure has prompted residents and visiting tourists to call the hills the "Jimmy Carter Range."



Long reach outboard control

Lone fishermen casting off the bow or amidship no longer need stagger astern to set the boat on a new heading or speed. A tiller extension lets you control most outboards up to 4 feet away in 3-inch steps. From $18.30. Gilco, 3715 Minnehaha, Minneapolis, Minn. 55406.

Parquet ceiling

Renaissance Italians called them "intarsia." Now parquet designs of inlaid wood patterns for ceilings come in do-it-yourself tiles in 12-inch squares or 2 by 4-foot panels. Armstrong Cork, Lancaster, Pa. 17604.

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Sun engineering is the difference.

Now you can do tune-ups at home using testing equipment of the same fine quality that most professional mechanics prefer. For more than 45 years, Sun has been supplying automotive service outlets with electronic diagnostic and service equipment. Sun's staff of engineers—largest in the industry—is involved daily in testing equipment development and design. A complete engineering department in Detroit works on a day-to-day basis with all the major car companies to keep updated on future standards and new developments.

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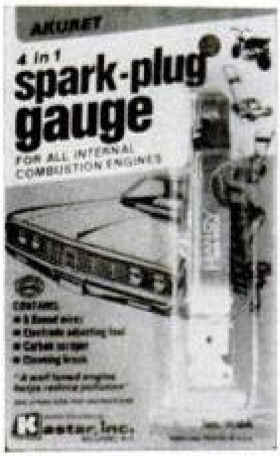
THE PM GARAGE
CAPSULE REPORTS ON NEW AUTO PRODUCTS BY THE EDITORS

4-in-1 plug gapper
How nice it is to get an inexpensive tool that actually does what it's made to do. Kastar markets a sparkplug gapper that sells for 95 cents. It's called the Akuret 100A, and it includes six gap wires, an electrode adjusting tool, cleaning brush and knife scraper.

You can use it for both plugs and distributor points, and it works on



Four-in-one plug gapper is only 95 cents.

every sort of sparkplug. Gap feelers range from .015 to .040 inch and are also calibrated in millimeters (38 mm to 101 mm). Check your local parts house or order from Kastar, Inc., Station Rd., Bellport, N.Y. 11713.—*M.L.*

Road emergency kit
This super auto emergency kit includes an air compressor, large and small adapters, tire gauge, two 15-minute red emergency flares, pocket flashlight with batteries and case.

To use the compressor, simply plug the cord into your cigaret lighter and attach the air hose to the tire. Available at department and auto stores for $40. Thomas Industries, Inc., 207 East Broadway, Louisville, Ky. 40202—*H.W.*

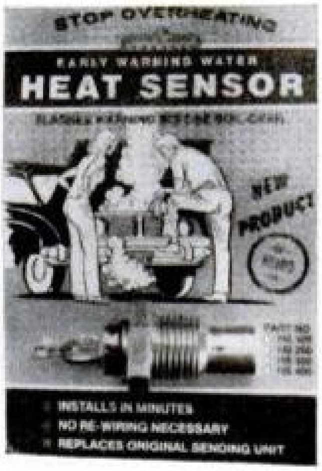
Emergency kit No. 205 comes with case.

Early warning heat sensor
Ordinarily, by the time your dashboard temperature warning light comes on in your car, the radiator is already boiling.

Here's a sensor, though, that starts to flash the dashboard indicator *before* your engine starts to boil. The light begins to blink at 15° F. below boil-over, then becomes steady at boiling. It later returns to blinking at approximately 20° below boil-over.

In many ways, that's a lot better than a temperature gauge that you might not notice before the steam starts to waft out from under your hood.

Installation of the new sensor takes about five minutes. You unscrew your standard engine-heat sending unit and put the new one in its place. No need even to drain



Heat sensor is an early-warning device.

your cooling system, and your old wiring hooks right on.

Units are available for all U.S. 1960-76 cars with hot and/or cold warning lights. But you can't, of course, use them with simple temperature gauges—just warning (idiot) lights.

The Early Warning Heat Sensor lists for $12.95. It's available at auto accessory stores, or order one directly from MLT Industries, 16602 South San Pedro St., Carson, Calif. 90746.—*M.L.*

Getting your boots off
All too often, the simplest jobs on your car are complicated for one reason or another. Just replacing sparkplugs can be a hassle—especially when you can't even get off the boots! You can beat frozen boots with this new puller from Thexton. (This is one of the products in its Trouble-Tamer line.) The puller really grips the boot and

Sparkplug wire puller is $5.50.

the stubby design lets you reach those in tight places. Thexton, 7685 Parklawn Ave., Minneapolis, Minn. 55435.—*B.H.*

Tune-up kit in a bubble
When it comes to replacement parts for his car, the savvy Saturday mechanic shops around. The parts in this bubble, for example, could be sourced individually with a small savings, but the bubble does offer convenience. I like the bubble approach for spare parts that I keep on board for emergencies. Sometimes they're in the car for years, so it's nice when they're hermetically sealed.

Shown here is one of a new line of tune-up kits for late-model Chrysler, GM and Ford cars. You get Champion plugs, PCV valve and filter (and ballast resistor for some models).

Prices are from $11 to $14, depending on make, model and engine. Rapid Auto-motive, 90 Inip Drive, Inwood, N.Y. 11696.—*B.H.*

Packaged tune-up kit.

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Why a small car demands more of an oil than a big car.

Just because small cars are easy on gas, easy to handle and have smaller engines, don't assume they're easy on oil.

The heat in a small engine can drain the life out of an oil.

Smaller cars with their 4- or 6-cylinder engines circulate their oil twice as fast as big sixes or eights. And they run at 25 to 30% higher revs. So there's more friction and heat in the engine.

Then to add insult to injury, they have less engine surface and less room in the engine compartment to get rid of that extra heat.

All this causes increased wear, tear and shear (thinning out) on your oil. Which can keep it from lubricating and cleaning properly.

From there it's only a short step to preignition, power loss and premature engine wear.

To solve this oil crisis, you need Castrol.

Castrol started out in Europe where small cars started out. So naturally it was Castrol that first added the additives a motor oil needs to protect those high-revving engines.

And today's Castrol incorporates the costliest additives available anywhere. That keeps Castrol from thinning out under intense heats and pressures. It keeps sludge from forming as the oil cools down. And it gives Castrol the strength to keep lubricating and cleaning the narrow passages in smaller engines.

Of the best selling oils, only Castrol has passed both U.S. and foreign car engine testing.

Since Castrol is designed to withstand the tortures of small car engines, we make sure it passes the engine tests for foreign cars set by the CCMC* (on a Fiat 124, Ford Cortina and Mercedes-Benz diesel) as well as the engine tests set up by the SAE** (on a '67 Olds 425 cid V-8 and a Ford 302 cid V-8.)

Then to satisfy ourselves even further, we test Castrol on two additional small car engines: a 1302cc VW and a 1798cc MGB.

So naturally, all grades of Castrol exceed all U.S. and foreign car manufacturers' specifications.

Now if you have a smaller car, you have some big reasons to change your oil.

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*Organization of European Car Makers, Engineers and Oil Manufacturers.
**Society of Automotive Engineers.

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HOMEOWNERS' CLINIC
QUESTIONS ANSWERED

Foundation for existing porch

I need to know how to place a concrete block or brick foundation under an existing porch or other structure. How do I go about it?—Arthur Pagles, Cedar Rapids, Iowa

You don't give the size of the porch or other structure you're referring to, which reduces me to guessing—something I'm reluctant to do. But, in general, the common practice is to support the existing structure temporarily with beams and 2x4s.

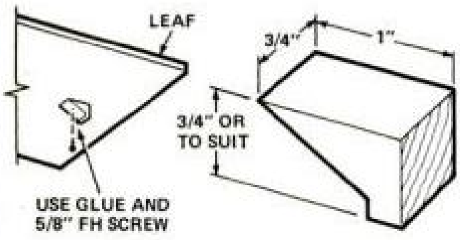
If necessary, you can jack up the overhang *slightly* so that it is possible to work underneath to place footings and lay up brick or block foundation walls. Once the foundation walls are laid and the mortar adequately cured, the structure is lowered onto the new foundation and the supports removed.

The porch should be fastened to anchors that are set in the foundation wall.

Leveling a table leaf

I have a drop-leaf table with one leaf sagging ½ in. or more due to the tip of the supporting wing wearing down. How can I remedy this so the wing will support the leaf level with the top?—R. Beeman, Bloomington, Ind.

It should be simple to make a small combined wedge-and-stop of the thickness needed to level the

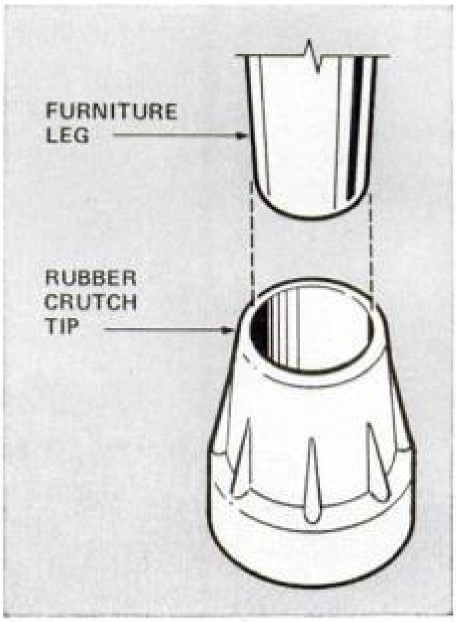


leaf as shown. Locate this wedge or riser at the proper point on the underside of the leaf so it will engage the tip of the wing. Fasten it in place with a small screw and a drop of glue.

Crutch tips prevent indents

I have a gossip bench that must sit in one place on a resilient tile floor to be near the telephone. I've noticed that the ends of the turned legs are making indents in the floor. How can I prevent these unsightly scars?—Mrs. James Roper, Chicago, Ill.

Measure the diameter of the legs about ½ in. above the lower ends. Then buy rubber crutch tips to fit snugly as shown. The rubber tips come in several sizes, so be sure you buy a size that fits the legs snugly. It may also be necessary to trim the top of each rubber crutch tip with a knife to avoid their inter-



fering with turnings that start low on the bench legs.

Water stains on marble

Our end and coffee tables have marble tops that have several water rings from drinking glasses. We've been unable to remove them. Have you a solution?—Walter J. Schuman, West Seneca, N.Y.

Are you sure they're water rings? If we can be sure, then the discoloration must be from the mineral content of the water. Not knowing with certainty the source of the rings makes the solution more or less a trial-and-error procedure. I would first try a light rubbing with a cloth dipped in mineral spirits. If this has no appreciable effect, then use a few drops of household ammonia on a cloth, or try scrubbing with vinegar. I think one of these cleaners should remove the rings, provided that they are water stains and not those of alcohol or another discolorant.

If the stains remain, purchase a marble cleaner from a local dealer. If that doesn't work, you may want to consider refinishing your marble surfaces. I'd call a pro—it's a messy and tricky job.

Do you have a home maintenance or repair problem? Send it to Homeowners Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. Letters cannot be answered individually, but problems of wide interest will be discussed in this column. For more home repair and maintenance help, get PM's Home Care Guide, $4.95 postpaid. Send orders to PM, Dept. HCG, Box 1014, New York, N.Y. 10019.

Soldering aluminum gutters

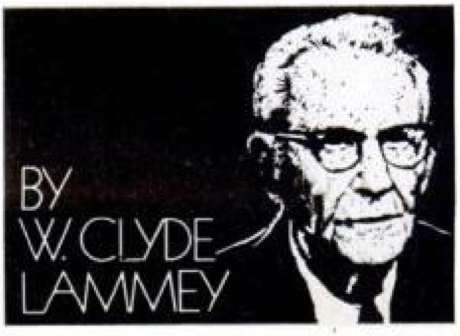
Is it possible to solder aluminum gutters? If so, do I use a soldering iron or torch?—Joseph Cancilla Jr., North East, Pa.

Yes, it's possible, using the special solders available. I would prefer the torch as it gives faster, more uniform heating of the metal. (*Caution: The danger of fire in this area is particularly serious since the overhang materials have been drying in the sun.*)

Removing plastic wall tiles

I'd like to remove the plastic wall tiles from one wall of a bathroom. How to remove the old tiles is the problem.—James E. Gladfelter, Baltimore, Md.

Try "prying" the individual tiles off the wall with a wide wood chisel ground to a long bevel. Or use a small square-shaped garden spade. If you're careful, no damage to the wall should result. Many of the tiles will break, but if you use a wide chisel with a long bevel and work from the corner of the tile, you can "pop" them off quite readily and also scrape off the cement residue as you go. Heating the tiles with a household iron or *flameless* heater helps to soften the adhesive and make the tiles somewhat easier to remove. Be careful not to overheat the tile— and *don't* use a flame-type heater. ★★★



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Kings, 15 mg. "tar," 1.0 mg. nicotine; Longs, 18 mg. "tar," 1.3 mg. nicotine, av. per cigarette, FTC Report Dec. '76

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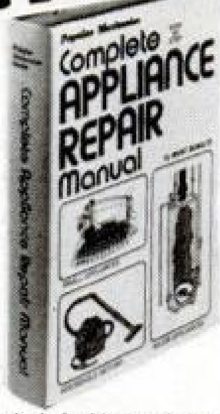

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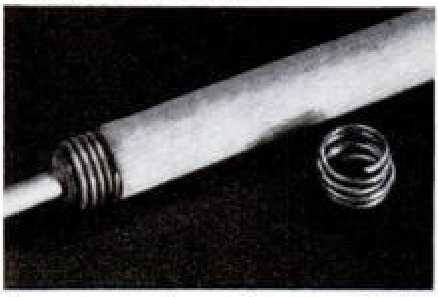
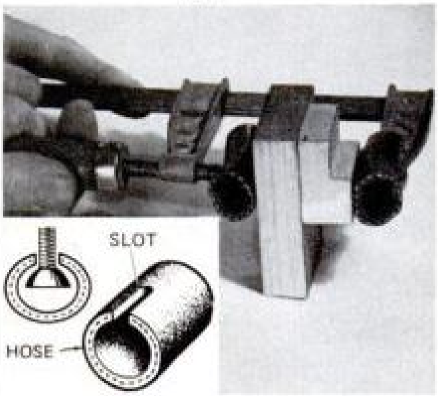
HINTS FROM READERS

Easily made ferrule



An easy way to make a ferrule for a wooden tool handle is to force a short length of coil spring (with coils close together) over the handle. Then coat the spring generously with epoxy glue.—*Walter E. Burton*

Pads for clamp jaws



Use short pieces of rubber garden hose as clamp-jaw pads to prevent marring the clamped object. Cut a slot slightly longer than half the length of each pad so the pad can encircle the jaw.—*Wesley S. Price*

Grooving dowels

When using dowels in joinery, glue-escape grooves are a must to prevent wood splitting due to pressure from the glue. To make such grooves, use pliers as shown. Make certain dowel holes are deep enough, too.—*Howard E. Moody*

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Try the light, smooth whisky that's becoming America's favorite Canadian.
Imported Canadian Mist.

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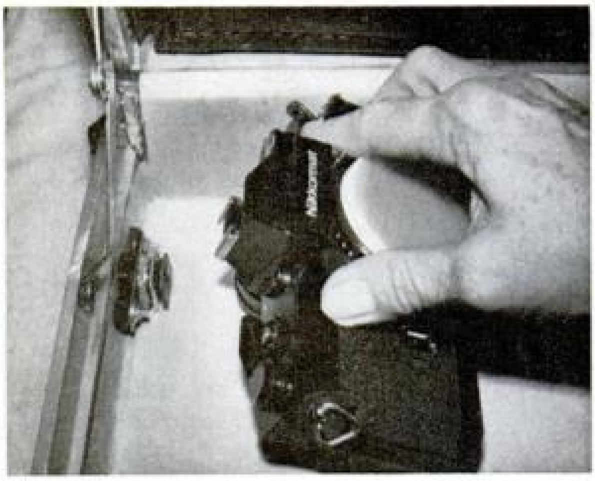
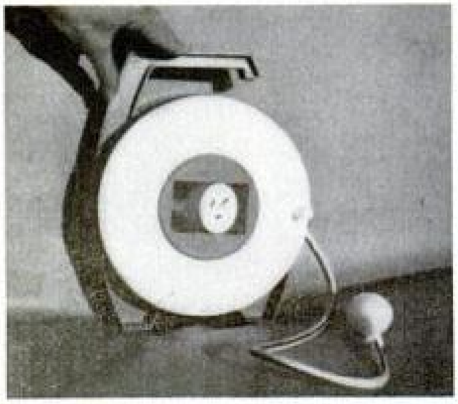


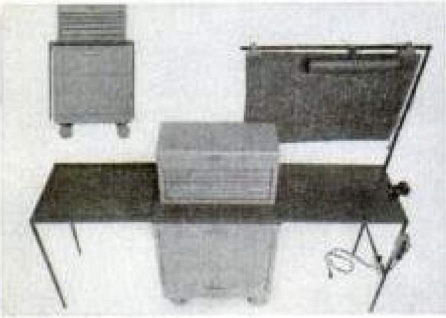
Briefcase camera stowaway

As any casual photographer knows, cameras tucked in a briefcase often slide around and are damaged. This clever arrangement eliminates the problem. An accessory flash shoe is bolted to the side of the case and locks into the camera's flash clip to hold the camera securely in place. A similar rig holds an extra lens beside it.

Extension cord rollaway

Ever cuss when your extension cord came up knots? A reel to keep it straight is $6 alone; $14 with 25 feet of cable; $16 with 50 feet. DMC Enterprises, 2082 Michelson, 212, Irvine, Calif. 92715.





Instant workbench

It's a rolling tool cabinet on locking swivel casters with rigid metal tables that slide out from each side to make a solid workbench. Made by CR Products, 906 North 17th St., San Jose, Calif. 95110.

Sideways on glass water skis

New trick water skis that work forward, backward or sideways, as illustrated by skiing champ Ricky McCormick, are made of glass. Cypress Gardens Manufacturing is testing them for sale this year.

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Only NRI gives you this 25" designed-for-learning Color TV...plus complete Quadraphonic Audio Center!

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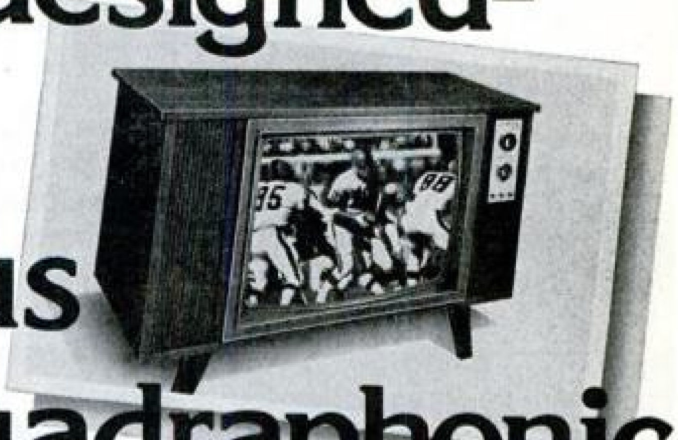

Two home training schools give you a hobby-kit Color TV to assemble. Two others give you a commercial set right off the shelf. Neither was designed to teach you how to repair Color TV's. Only NRI invested the time and money to design equipment with learning in mind!

No other home training school gives you both a solid state Color TV and SQ™ Quadraphonic Receiver complete with four speakers...all in one course. In fact, to even match this kind of thorough training at another school, you'd have to take an extra course costing hundreds of dollars more. And only NRI courses in Color TV/Audio servicing let you learn on equipment designed specifically for training.

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NRI engineering eliminates the cost of buying from an outside source. We pay no salesman's commission. Students are enrolled by mail only. The savings are passed on to you in the form of low tuition fees, extras like the TV's console cabinet and the Quadraphonic System; professional test instruments like a 5" triggered sweep oscilloscope, CMOS digital frequency counter, and integrated circuit Color TV pattern generator. You can pay hundreds of dollars more for similar courses and not get a nickel's worth more in training and equipment.

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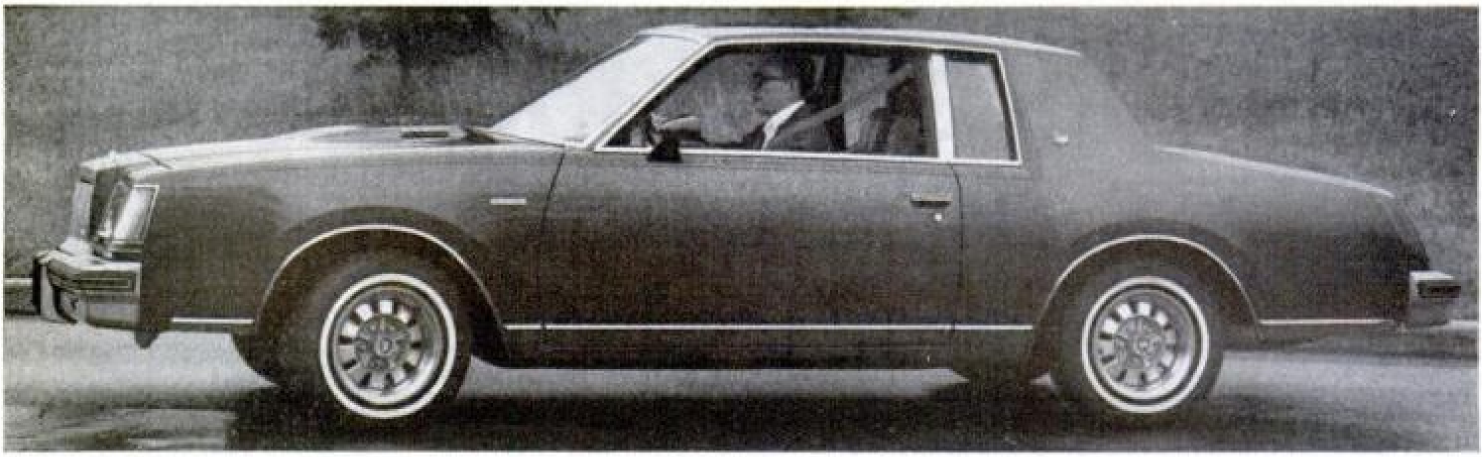
FIRSTHAND REPORT

'78 CARS

Driving Buick's turbocharged V6

Turbocharging is nature's way of turning the new 1978 V6 Buick Regal Sport Coupe into a flash on the freeway without guzzling gas.

by Robert Lund DETROIT AUTO EDITOR



Among General Motors' new lineup of intermediates for 1978 is the Buick Regal Sport Coupe. Bubble hood is tipoff that it's a turbo V6.

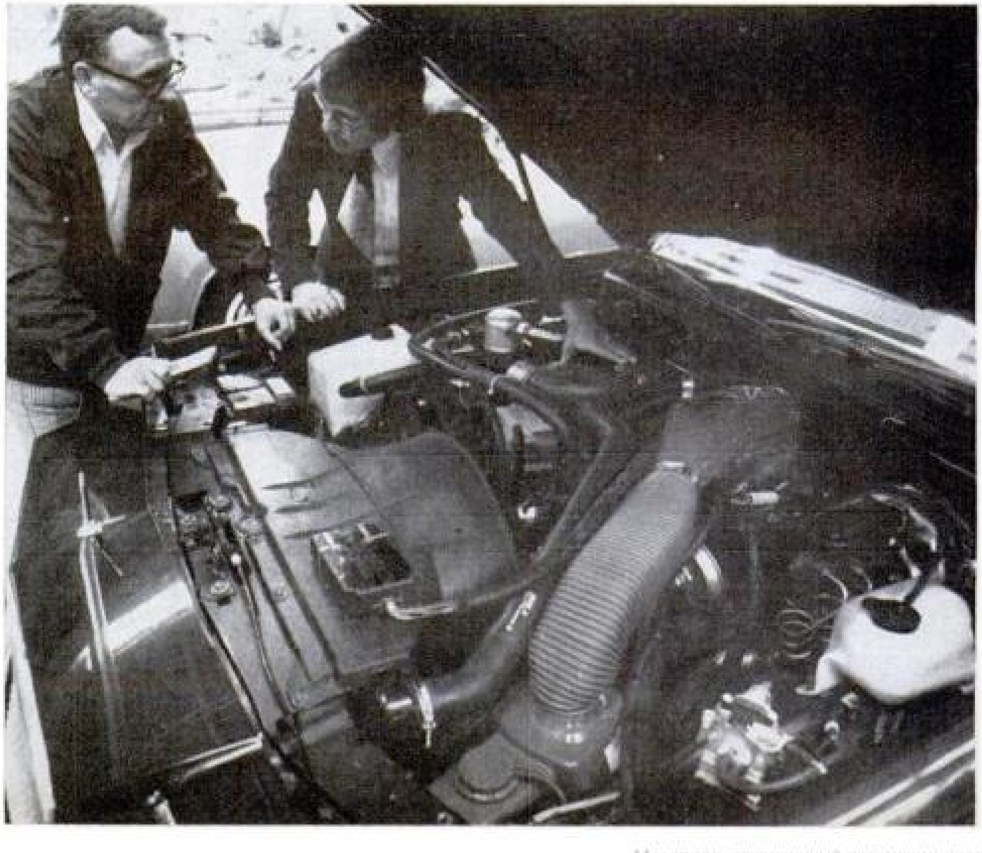
If you're one of those drivers who play getaway with other cars at stoplights, don't try to take on a '78 Buick with a bubble hood unless you have a sporting big V8 to back the challenge. You'll lose.

The bubble hood means the car has a turbocharged V6 engine. It will do 0 to 60 in 10 to 10.5 seconds. If you hold the gas pedal to the floor, the car will do around 115 to 120 mph (estimated because the speedometer needle goes up only to 85 mph, and it's tried only on test tracks).

The turbo V6 is one of two new GM engines for '78. The other is the Oldsmobile diesel, which will probably attract more gee-whiz comment because it's the first diesel in an American production passenger car. But the Buick engine is likely to be a more important development in terms of influencing future engines. Ford is working on a turbocharger for '79 and GM is expected to extend

(Please turn to page 44)

Before the test drive, Tom Wallace, staff project engineer of the Turbo Group (right) briefs the author on installation of turbo on the V6.



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Starting out on "no-thump" Goodyear Cushion Miler RV tires makes your whole day go better.

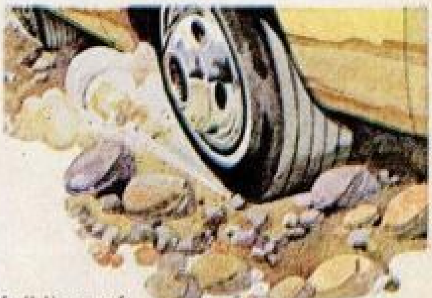
Goodyear Cushion Miler RV tires have polyester body plies: they won't flat-spot, even after your vehicle has been parked overnight. That means you'll have a smoother, quieter ride than you would have with flat-spotting tires. You'll be a lot less likely to experience pans rattling and items in your refrigerator breaking and

spilling. And chances are you'll even be less fatigued at the end of the day.

But don't let the smooth ride fool you. Goodyear Cushion Miler tires are strong. They're designed for stability and resistance to sidesway. The broad, flat tread offers firm, full contact with the road.

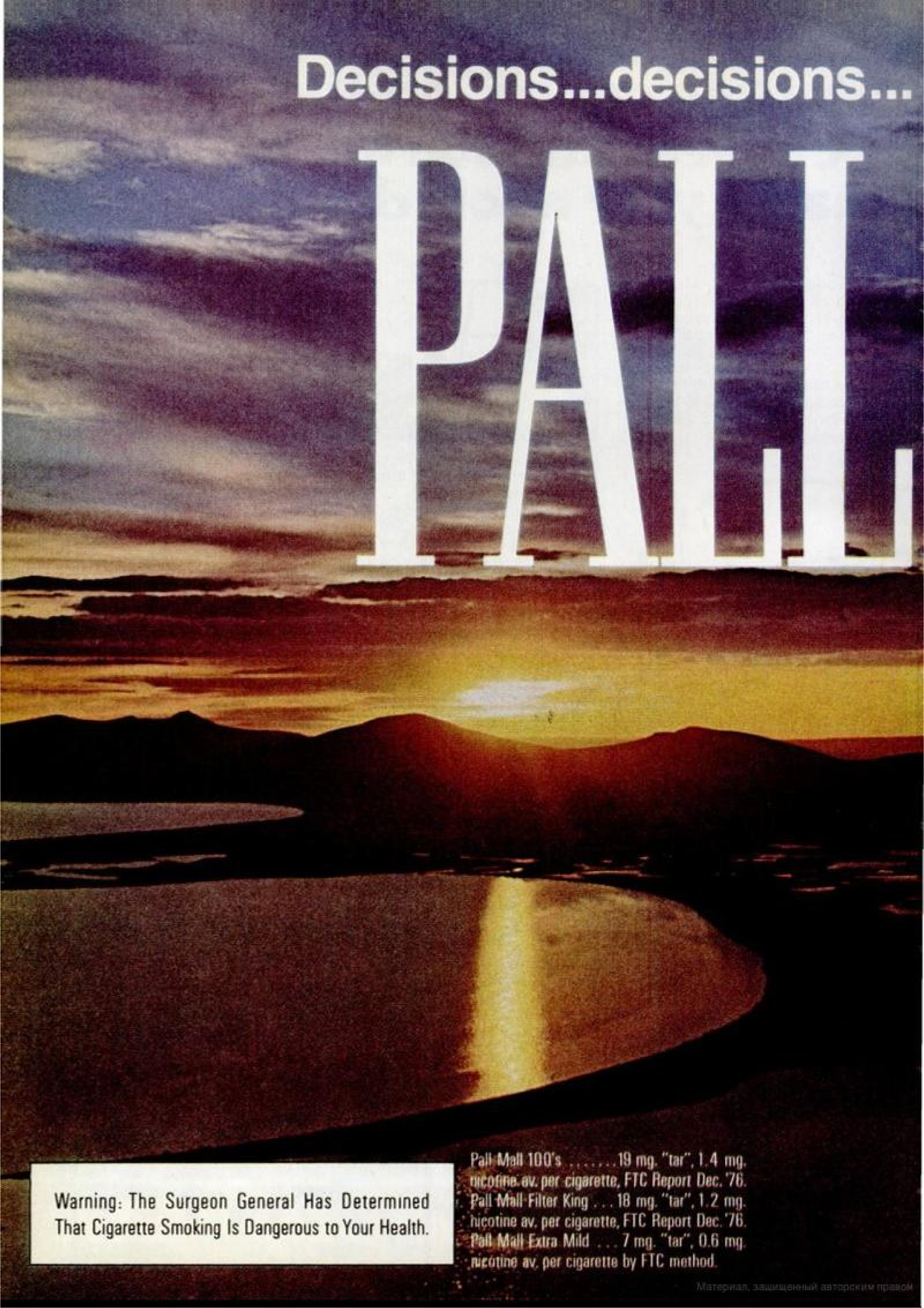
And the traction edges on the tread are angled to provide grip and responsive handling on the highway. So they're easy to drive.

Those are just some of the reasons why more roads and trails get blazed on Goodyear's



full line of tires than any other kind.

Goodyear Cushion Miler tires. The right way to start out.



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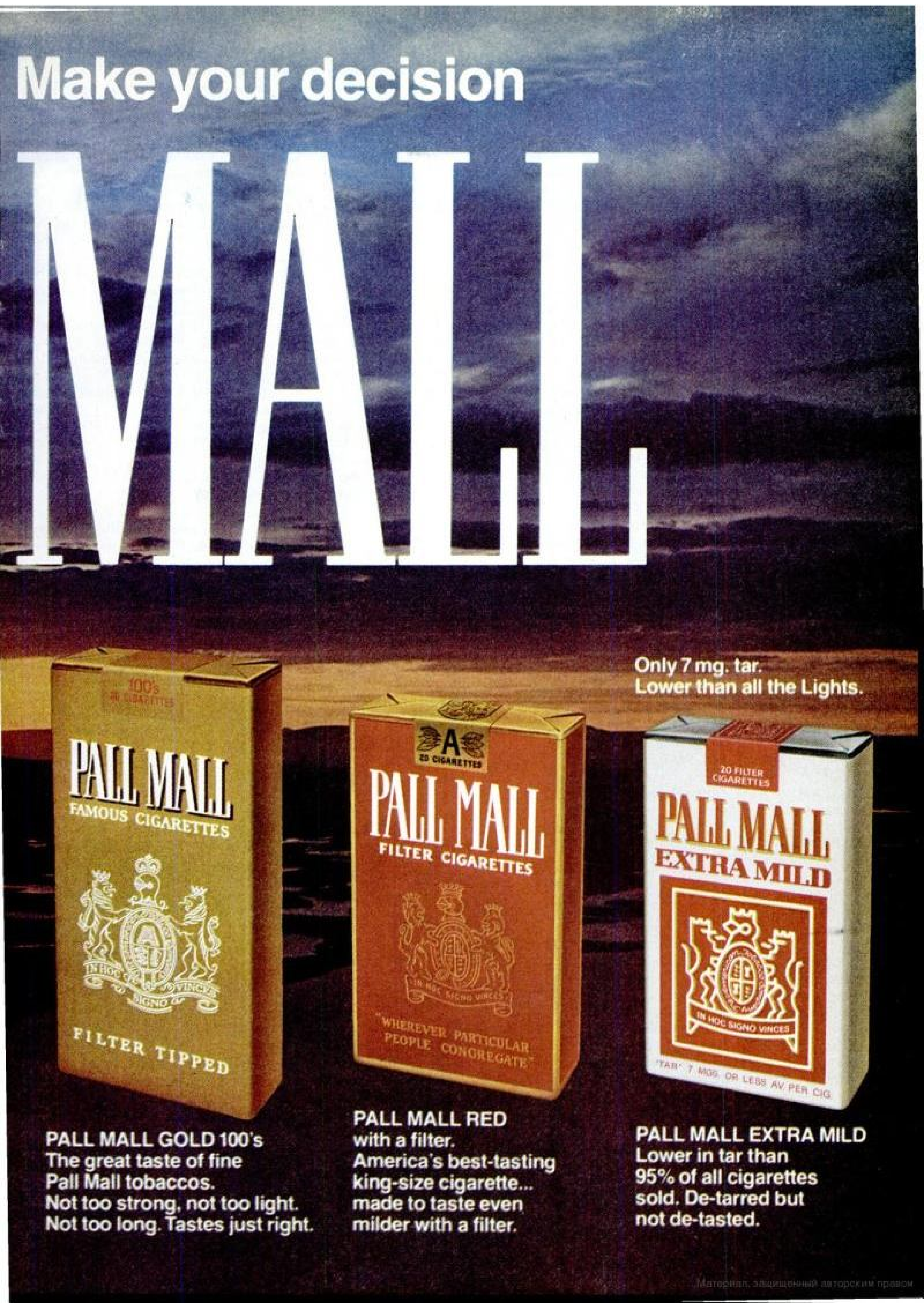

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DRIVING BUICK'S TURBO V6

(Continued from page 40)

the Buick engine to Chevrolet and Pontiac a year hence.

Turbos not new

Turbocharging isn't new. Engineers have been tinkering with it for years. Turbos are widely used on big diesels and aircraft engines. Porsche and now Saab (see page 16) sell turbocharged cars here, and Mercedes will soon have a turbocharged diesel in its passenger cars. GM offered turbo engines on some Oldsmobile and Chevrolet models in the early 1960s. The earlier GM engines were complicated and cumbersome, a pistol to manufacture and a pain to service.

Buick has corrected the faults of the engine, cleaned it up and simplified it. If you want pretty fair fuel economy with plenty of power, the turbocharged V6 is about the best engine you can put in a car. You get good gas mileage without sacrificing performance. The turbocharger lays back until you call for power. It kicks on as you increase pressure on the gas pedal.

The turbo increases engine power by using exhaust gas to drive a compressor in the intake system. As engine speed and load increase—such as when pulling a trailer or going up a steep incline—the compressor forces a larger mixture of fuel and air into the combustion chamber. As the driver accelerates to compensate for engine load, the turbocharger takes over. And vice versa. The turbo "backs off" under light load conditions or at normal speed. When it idles, a smaller air/fuel mixture is delivered to the cylinders.

Who needs it?

Three cheers for Buick. But if you're name isn't Foyt, Sneva, Unser or Dallenbach, who needs a car that can top 100 mph?

Nobody. But there are situations when extra power is necessary.

Some current cars are underpowered. This is no problem if you're driving a two-lane, one-way freeway separated from oncoming traffic by a median strip. But if you get off on a two or three-laner with two-way traffic and get behind a truck or Sunday driver, it's almost impossible to pass with an underpowered car. After 15 or 20 minutes of trying to peek around a slowpoke, people get impatient and take chances. If the car doesn't have the zip to make the maneuver in 8 to 10 seconds, you can wake up in a hospital or not wake up in a morgue. The auto companies feel that as accident and death rates increase due to cars being underpowered, the government will require that automobiles have a built-in passing capability.

That's the story behind the power Buick has packed in the engine.

A Six beats an Eight?

The turbo will be the standard engine on one car, a new sport coupe called Regal. It will come in two-barrel and four-barrel versions. With a two-barrel, the horsepower rating will be 150. With a four-barrel, it will be 175. Buick's standard V8 is rated at 155, so the four-barrel turbo will beat it by 20 hp—a neat feat.

The company had not completed its mileage tests the day I drove the car at GM's Milford, Mich., proving grounds, but Buick expects the turbo to deliver around 22 mpg. That's 2 to 3 mpg over a comparable V8.

The turbo is mounted directly over the intake manifold. Buick says this position minimizes the distance between carb and engine, avoiding a performance lag often associated with turbochargers.

There's a black box

The engine has an electronic control dubbed by Buick as "the turbo control center." The "black box" is mounted on top of the radiator. The system monitors the engine's detonation level and adjusts spark to keep detonation "at an acceptable level" during acceleration. The sensor also provides better spark control for maximum fuel economy under normal driving conditions. Compression ratio is the same—8 to 1—as on a regular V6 without the turbo. The engine weighs 150 to 300 pounds less than a comparable V8.

A square window on the instrument panel near the steering wheel has three signal lights that work like a vacuum gauge. A green light bar indicates normal driving, normal load and good fuel economy. A yellow light means harder acceleration and a heavier engine load, such as climbing a hill or when pulling a trailer. An orange light means the turbo has cut in to deliver extra power. *Small criticism*: Yellow and orange are not particularly good colors for visibility and I think there are others that would show up better against the background.

The car I drove had a solid feel, handled well, hugged the ground taking curves and clipped along with virtually no noise. Tom Wallace, a Buick engineer who accompanied me on the drive, said a slight turbine whine is sometimes detectable at high speeds, but I couldn't hear it at any time.

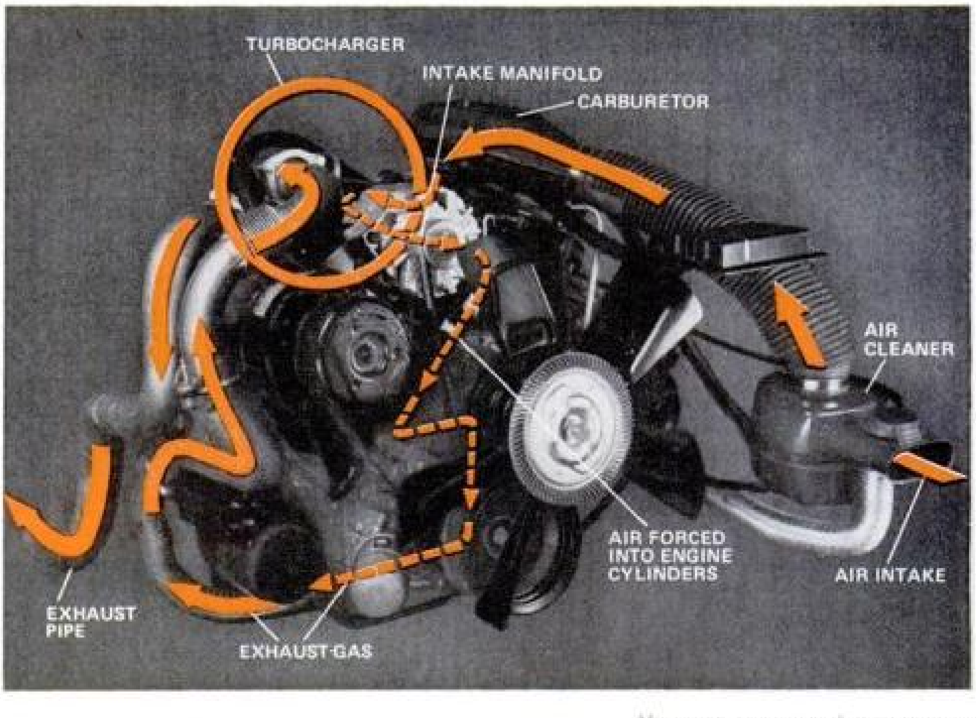
Taking it easy

Though no cops hand out tickets at GM's proving grounds, I did not push the car—70 to 75 was enough—nor try a panic stop. I figure if GM brings out a speed machine, it knows enough to equip it with brakes to stop it.

Up to now a model in Buick's Century line, Regal will be offered as a separate car in '78.

Buick wouldn't say what the turbocharger will cost, but it will exceed that of a V8. Assuming the difference isn't too great, I can't see much market for the Eight. Why buy an Eight if you can get a Six that will run rings around it and give better gas mileage as well? ★★★

Turbocharging gives a free ride: Exhaust gas drives a turbine which spins a compressor in the intake system to force a greater volume of air and fuel into the cylinders.



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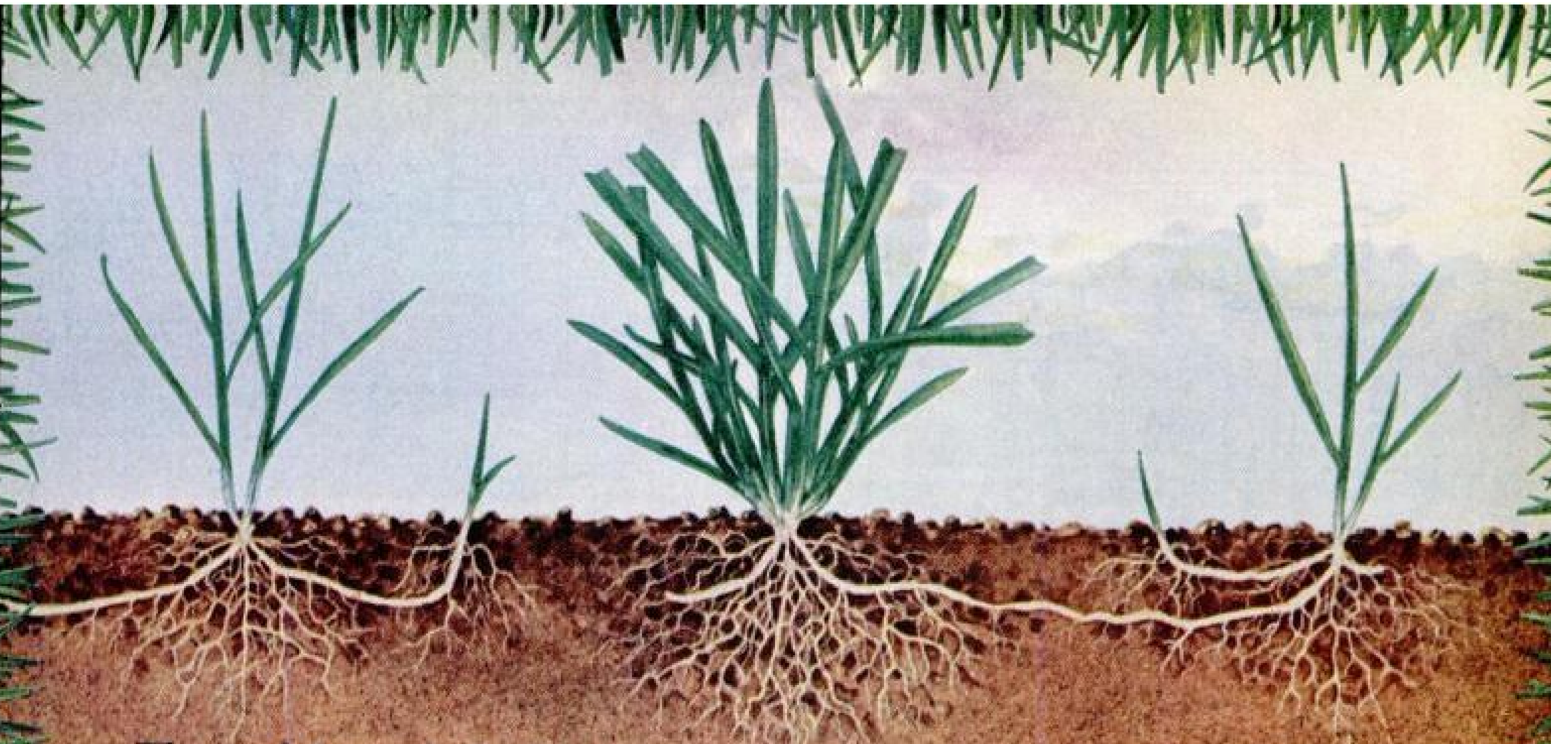


The earth has a clock all her own when she does things or doesn't. And one of the things she does is make grass grow differently in the fall than it does in the spring. No kidding. Your lawn gets thicker in the fall.

A little Turf Builder in early fall and your grass will grow sideways.

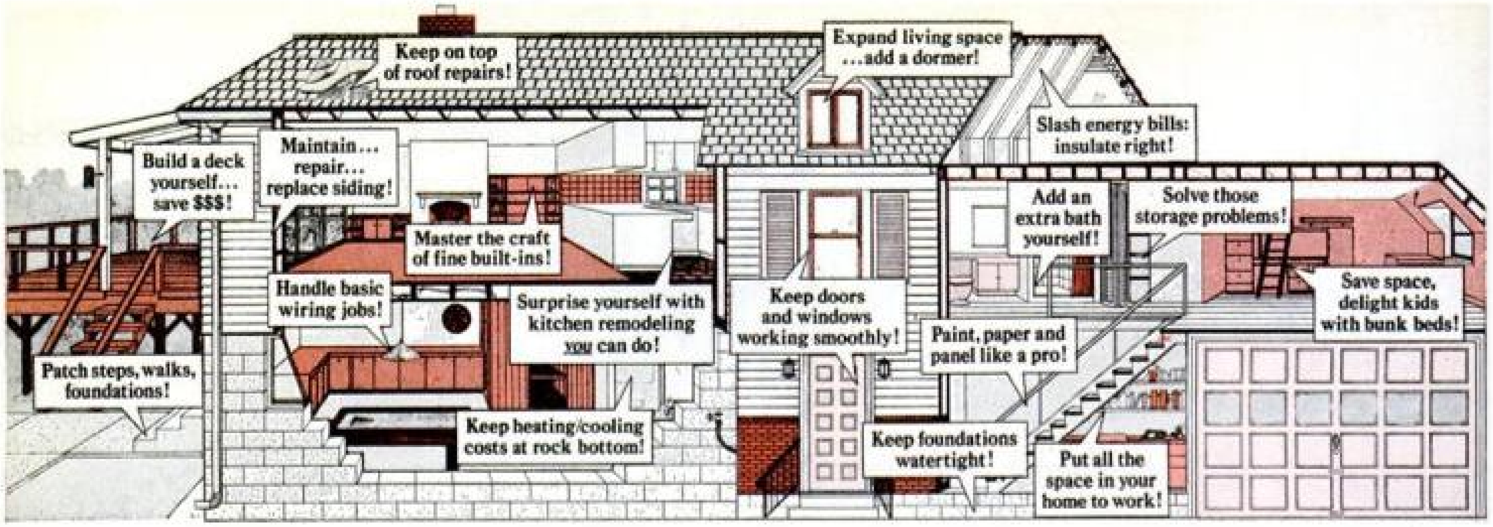
In the spring, everything reaches up for the sun and grass blades do too. They grow up and up. But with the warm days and cool nights of fall, this upward growth is slower and your grass actually grows more sideways and starts new grass growing beside itself. It does this by sending out tillers and rhizomes and these send down new grass roots. You couldn't pick a better time to put down some fertilizer.

So if you spend just a half an hour with a spreader and some Scotts® Turf Builder,® what you will get for it is a darker thicker lawn that doesn't take as much mowing as it did in the spring. And that isn't all you get for your half hour's work. You also get a knitting of new roots to take the worst of winter, along with a storage of carbohydrates down in the ground that will get your turf started earlier than most other lawns next spring.

We make Turf Builder so that it lets its nitrogen out a little at a time to keep on feeding your roots for just about 8 weeks. (We have U.S. Patents on the way our Turf Builder is made.) And if you happen to have some weeds and dandelions you want to get rid of at the same time, we also have Turf Builder Plus 2.® This gives you a weed control with fertilizer mixed in with it. More grass and good-bye dandelions with one pass of your spreader.

A little Turf Builder right now will keep your lawn full and healthy all through fall, and all it takes is about the same time as a trip to your local car wash and back. We do it ourselves and if you want to see our lawn, just stop by.

We're easy to find. We're the Scotts people and we've been here in Marysville, Ohio, for 100 years.



Now, America's outstanding "how-to" publisher introduces a series that can help you save hundreds of dollars a year!

TIME LIFE BOOKS presents HOME REPAIR AND IMPROVEMENT

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With money as tight as it is, who can afford to spend $15 to replace a 15-cent washer . . . $50 for installing a simple electrical outlet . . . $400 for repairing a water-damaged ceiling! Yet these prices are typical of the outrageous costs of home repairs and improvements today.

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Basic Wiring clearly explains your home electrical system. Detailed, easy-to-follow instructions show you how to make good, *safe* connections . . . how to run wiring through walls and ceilings . . . how to install new outlets, dimmer switches, doorbells, recessed lights . . . how to run outdoor cable underground . . . much more! You get the know-how you need to take the mystery out of home wiring. See for yourself – we'll send you *Basic Wiring* to examine and use for 15 days without cost. Details are in the order form. Mail it to TIME-LIFE BOOKS, Time & Life Building, Chicago, Illinois 60611.

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☐ Ms. ______ (Please Print)

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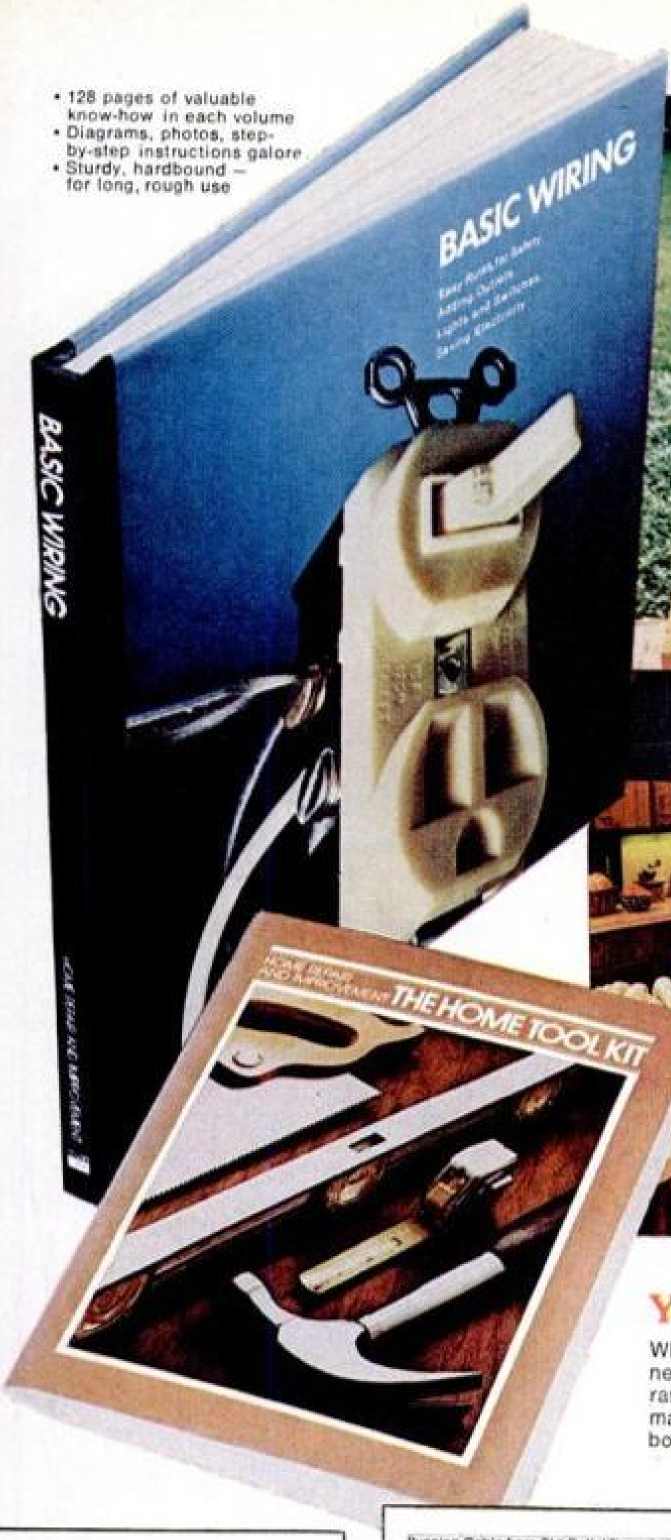

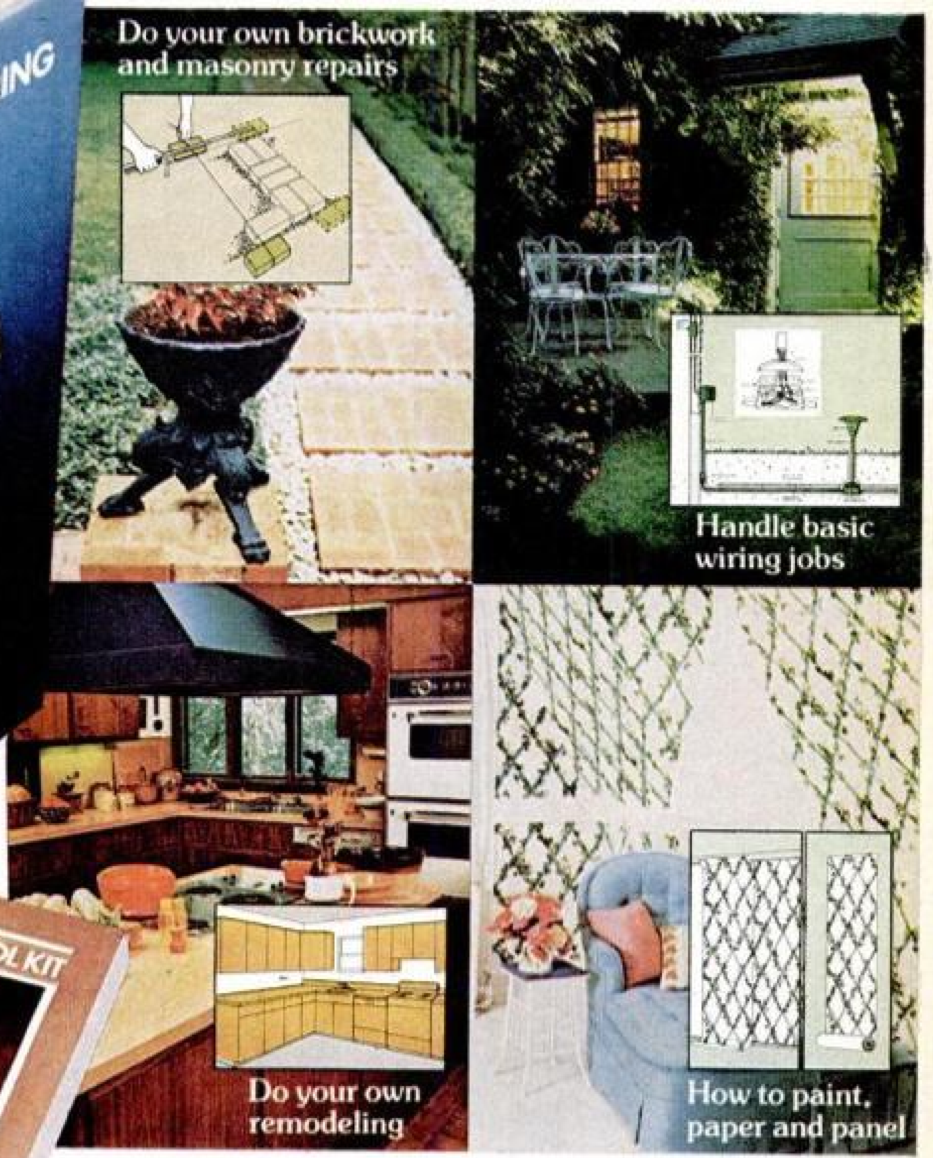

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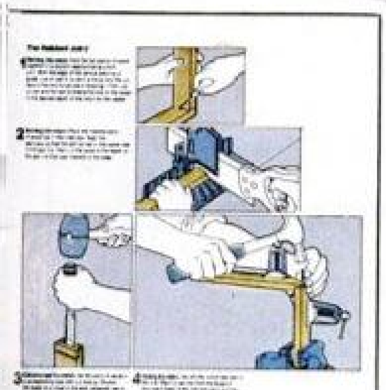
What constitutes the well-balanced tool kit? How many hammers do you need? Screwdrivers? How to get the longest wear from saws, files, chisels, rasps? From key factors to consider when buying a tool to general tool maintenance — it's all covered in *The Home Tool Kit*, a valuable booklet free with purchase of *Basic Wiring*.



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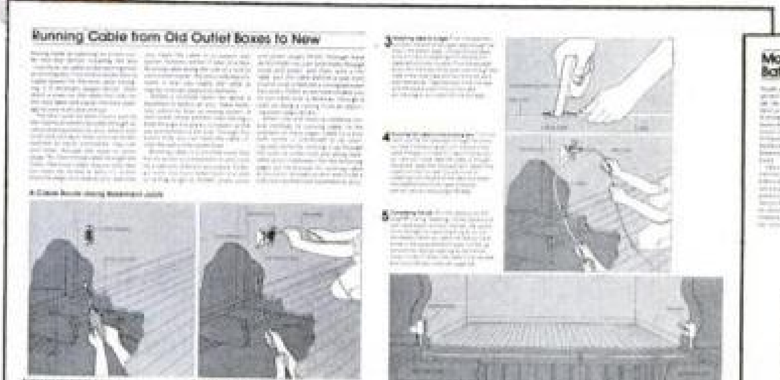
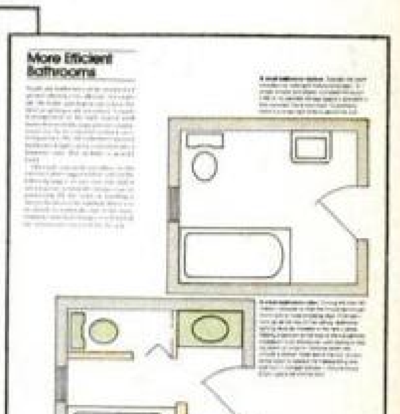


Whether you're a beginner or veteran handyman, crystal-clear text, drawings, charts, color-coded diagrams help develop or enlarge skills. You'll be surprised at how "tough" jobs are made easy.



Know-how you need to tackle remodeling jobs in any area of the house.

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PM WORKBENCH
PM EXAMINES PRODUCTS AND SERVICES

Energy-saving tip

You can help to beat high utility costs by turning down the water heater control, says the National Assn. of Realtors. Nearly every water heater has a control which permits the owner to select such settings as warm, very warm and hot. Studies have shown that too many people often keep the setting on hot when it's not necessary, thus wasting energy heating the water to a higher-than-needed temperature. Keep the temperature in the 110° F. to 120° F. range and your utility bill will be lower.

For more information on saving energy dollars at home, get the booklet, *The Energy Crisis Hits the Home*, from a local realtor.

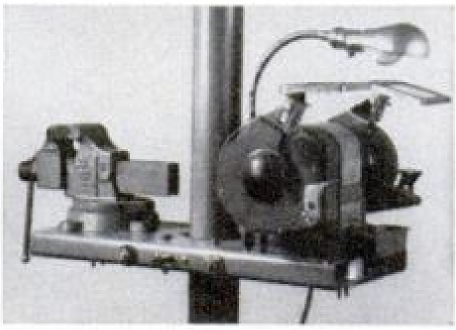
Finishing made easier

Readers frequently write in asking for information about finishes. Most want to learn which ones give handsome results with very little effort. Now a product from McCloskey Varnish Co., 7600 State Rd., Philadelphia, Pa. 19136, Tung Oil Varnish, lets us answer those queries easily. Formulated for use on bare wood, it goes on using a clean, lint-free cloth. The varnish has deep penetration. One coat will provide a low-luster finish, two coats a satin sheen and three a glossy look. It can be used on refinishing projects after stripping wood. $4.70 a pint.

Transparent finish is fast-drying.

Lally column put to work

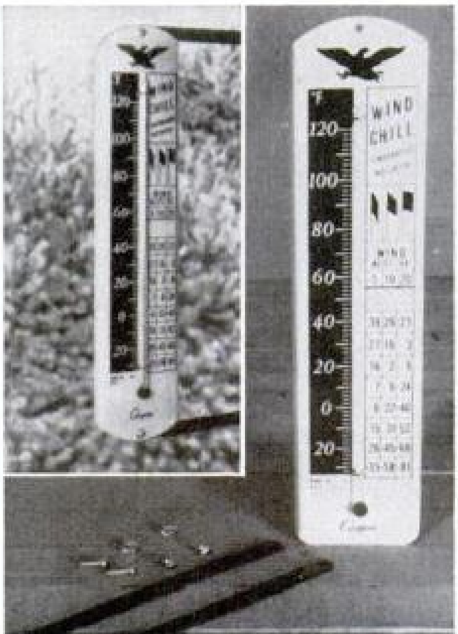
Here's a quick and sensible way for basement workshop owners to free up valuable workbench space—by mounting vises, grinders and the like on Column Bench. The device can be attached at any height to any lally column from 2½ to 4⅛-in. o.d. Of 12-gauge steel, the 10x24-in. shelf can also be mounted elsewhere by using a 4x4 post. It costs $29.95 f.o.b. from the maker: Alliance Tool & Machine Co., 17850 Mount Elliot, Detroit, Mich. 48212.



Workshop on a column—it works!

Thermometer gives wind-chill

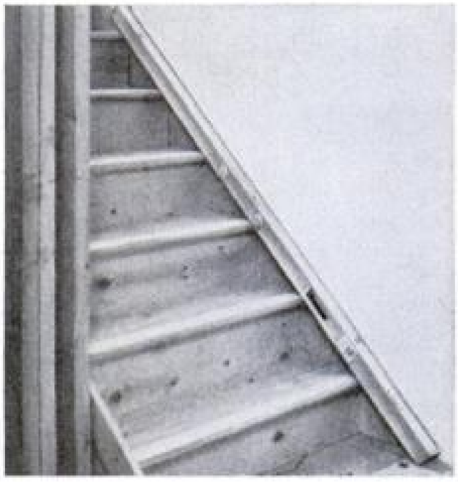
Wind intensifies cold, particularly when air temperature drops below 40° F. The scale on this thermometer shows the wind at 5, 10 and 20 mph. Beneath each speed is a temperature column which begins at 40° F. To figure wind chill, you read across at the thermometer's mercury level. About $3 from The Cooper Thermometer Co., Reed Gap Rd., Middlefield, Conn. 06455.



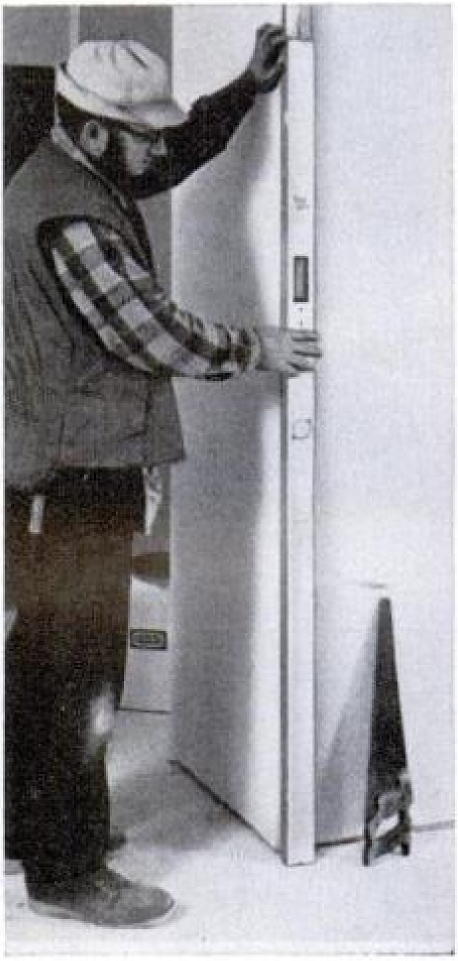
Indicator tells you how cold it feels.

Good for house carpenters

A 6-ft. plumb rule that extends to 10 ft. includes an angle indicator, bubble level and plumb vials. A welcome addition to a carpenter's toolbox, it's $89.95. Ag-Man, Inc., Box 434, Kewaskum, Wis. 53040.—Harry Wicks, Home and Shop Editor



Plumb rule extends to 10 ft.; used to check angles (above) or plumb (below).



If you've come across a new product with some special features, let us know about it. Write to PM Workbench, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019.

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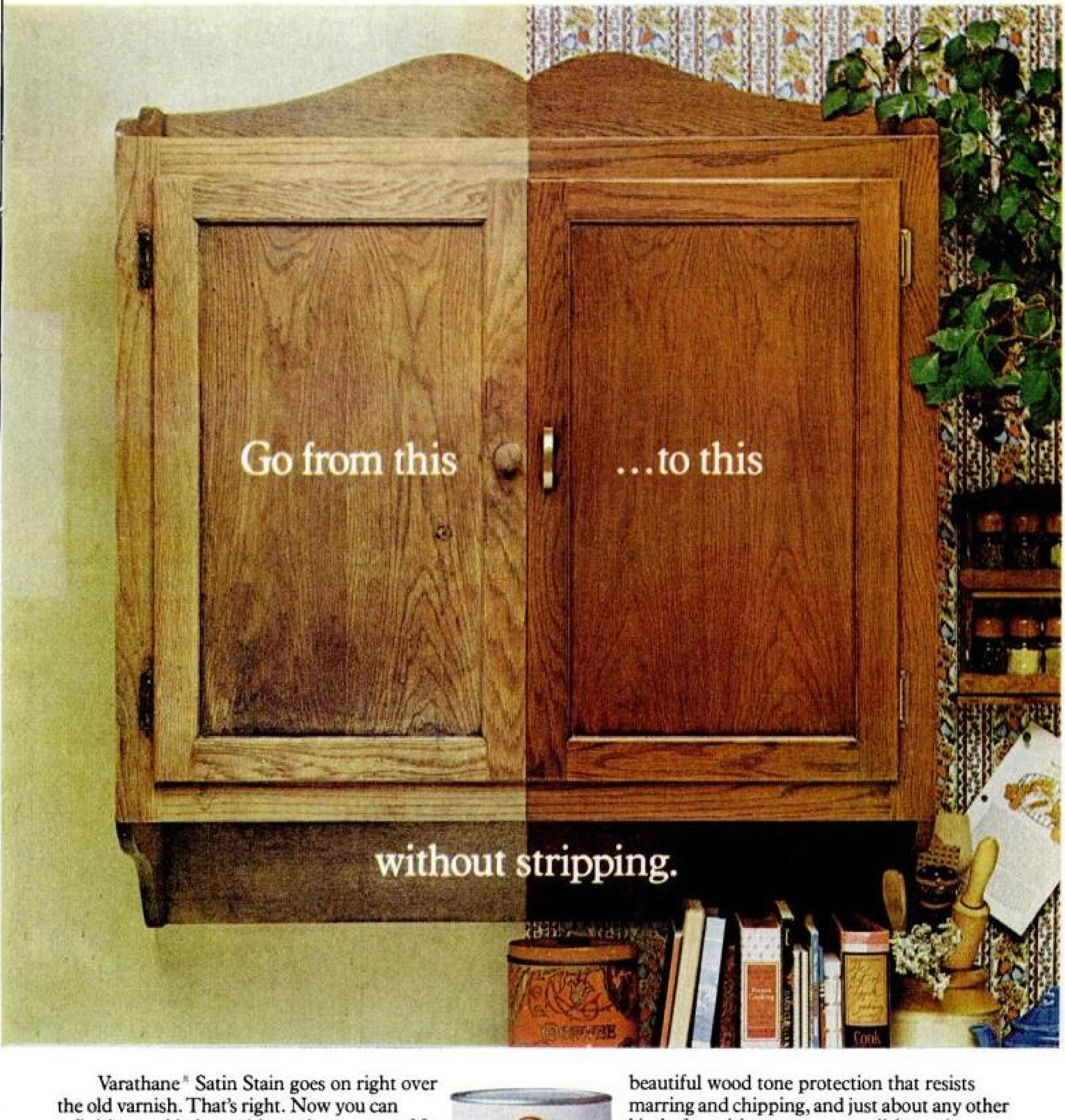
No need to remove old varnish.



Varathane® Satin Stain goes on right over the old varnish. That's right. Now you can refinish your kitchen cabinets the easy way. No longer do you have to spend days in preparation. Just wash and sand lightly (for adhesion) and brush on Varathane Liquid Plastic Satin Stain. No messy paint removers or special skills required. Just like that, a beautiful new wood finish right over the old — without stripping.

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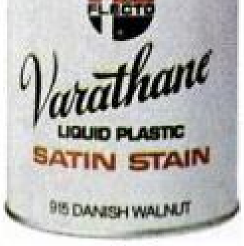

And Varathane Satin Stain doesn't stop in the kitchen. It's terrific on floors, doors, tables, chairs, walls and any other varnished surfaces that need refinishing — without stripping.

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CAR CLINIC

SOLUTIONS FOR MECHANICAL HEADACHES BY MORT SCHULTZ

Down Mexico way

In a recent column you advised that a possible cause of hesitation, stalling and stumbling in 1975-76 AMC cars is the in-tank fuel filter (3163974). You wrote that if this filter was plugged, hesitation and so forth would get progressively worse as the fuel level got lower while the car was driven at highway speed. You also said to suspect this filter if the engine couldn't be restarted within 3 to 6 minutes after stalling.

Well, Mort, we're experiencing exactly this problem. I wrote AMC, but they said they didn't know anything about this filter and suggested a tune-up. A tune-up hasn't helped. What's up?—David Weeks, Mexico, N.Y.

Who answered your letter, Dave—a clerk in the accounting department? You ought to refer him to AMC's Technical Service Manual. Under the heading "Fuel Filter" (Section 4) it states: "The fuel system is further protected by a woven Saran, sleeve-type filter attached to the end of the fuel outlet tube *inside the fuel tank.*"

The number that I gave before, 3163974, is the new number for this filter, which is 2¾ inches in diameter. The old number is 3184620. If one number doesn't get you the filter, try the other. A third number exists—3230376. This is for a filter having a 4¾-inch diameter, but it applies to 1977 models only.

Take my hand

Recently, the carburetor in my 1974 Dodge Dart (225-cu.-in. engine) was cleaned and reset. I state this as a prelude to explaining my problems, which are:

- *An idling speed that keeps stepping up—so high, in fact, that when I shift into Reverse the frame pops. Resetting idle using the idle adjustment screw doesn't help.*
- *An engine that dies or sputters every time I make a deep or fast left-hand turn.*

My mechanic says he's lost. Would you please help us out of the woods?—Ian Madden, Palestine, Tex.

Follow me. First, let's emphasize that we're talking about two different problems. The fact they are occurring simultaneously is coincidental.

Your idle speed problem is probably *not* being caused by an internal malfunction. Your not being able to adjust speed by means of the idle speed adjusting screw and your having cleaned and reset the carburetor attest to that. I would therefore look to the following possible causes:

1. A throttle linkage that's hanging up or one that isn't adjusted correctly. I have a hunch this is the trouble. Whether you're adjusting linkage for a car having a manual or automatic transmission, the fast-idle cam must be released while the adjustment is being done.

2. Either the choke or fast-idle speed (maybe both) is not adjusted correctly, or maybe a damaged choke or fast-idle mechanism part is fouling up the works.

3. Perhaps the electric coil to the choke has burned out or isn't connected, causing the area around the choke to stay sufficiently cool so the choke plate remains partially closed. The likelihood of this with a 225-cu.-in. engine is remote because the choke lies close to the hot exhaust manifold, but it's worth a look.

Okay, we're almost out of the woods. Let's discuss that left-hand turn problem. The cause is probably centered around the carburetor float. Either the float's level is out of kilter or the float is damaged and is partially saturated with gas, which leads to a condition we call a "sinking float." When the car makes a "deep or fast" left turn, the shift in position causes the "heavy" float to lift the needle valve off the seat too much. Excessive gas flows into the carburetor, and the engine floods.

I would:

1. Check the float level to make certain it's set to exact "book" specifications.

2. Check the float for damage. Ground the ignition system so the engine won't start. Crank the engine for several seconds. Remove the float bowl cover. The bowl should be filled about halfway with gasoline. The float should be lying in gas, so one-half is below the surface. If more than one-half is covered, the float is sinking. Replace and readjust level.

Cup of tea

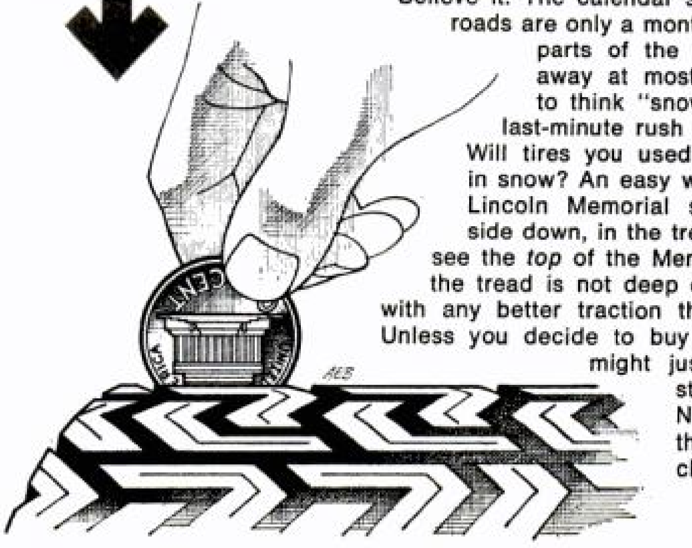
My 1973 Pontiac LeMans went 21,000 of its current 46,000 miles without a lick of trouble. However, in the last 25,000 miles it has given me fits with a front-end alignment problem that no one, including the dealer, can solve. The right-hand front tire develops "cups" every 10

(Please turn to page 54)

PM CAR CARE **tip**

Coming up: winter

Believe it. The calendar says that snow-covered roads are only a month or two away in some parts of the country—two or three away at most in other areas. Time to think "snow tires" and avoid the last-minute rush if you need new ones. Will tires you used last year sustain you in snow? An easy way to tell is to put the Lincoln Memorial side of a penny, upside down, in the tread grooves. If you can see the *top* of the Memorial above the tread, the tread is not deep enough to provide you with any better traction than conventional tires. Unless you decide to buy new winter tires, you might just as well leave your standard tires mounted. No sense going through the fuss and bother of changing shoes.



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CAR CLINIC

(Continued from page 52)

to 12 inches around the outside edge of the tire. The front end has been aligned three times and front shocks have been replaced. Could you tell me why I have this problem and what to do?—Robert W. Mims (address not given)

Why? Either the toe-in is not being set right or the toe-out-on-turn adjustment is out of whack (I'll bet on this one).

What to do? Have a more sophisticated front-end shop double check the toe-in and then look for a bent steering arm which, if found, should be replaced.

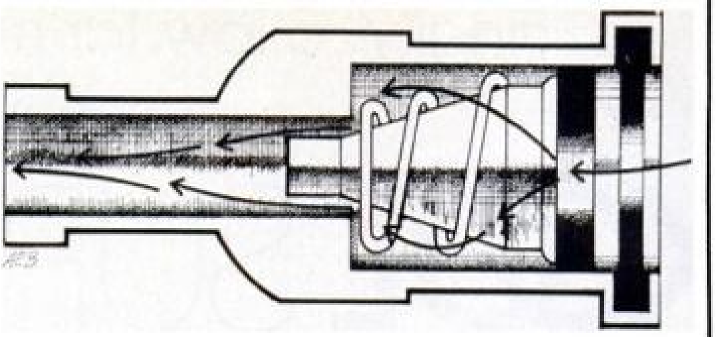
Doing the hustle

I own a 1973 Jeep Commando which has a violent shimmy in the front end when rounding a gradual curve at speeds from 25 to 45 mph. The shimmy becomes so violent at times that I'm forced to bring the vehicle to a complete stop to regain control. My dealer says there is no cure except to rotate tires from front to rear, and balancing and alignment, all of which have been done. I've even installed Road Huggers and heavy-duty shocks. Please suggest something before I kill myself or someone else.—E. S. Grogan, Martinsville, Va.

Yipes! Here's another case where important service information issued by a manufacturer to dealer service shops is put in high-style binders and forgotten. This serious, dangerous problem was the subject of a lengthy bulletin (TSB No. 4, 7300-series, group 10.000), which was issued in June, 1975, by AMC. Its title is *Front End Shimmy.*

The bulletin gives the following as

PM CAR CARE tip



Weak link

If there's a part that's neglected most often during a tune-up, it's the PCV valve. It must work as shown, with just the right amount of air flowing through. Depending on its position inside the valve, if the piston sticks, one of the following will occur.

Airflow will be restricted, causing a richer mixture and poorer fuel economy.

Too much air passes through, leaning out the mixture too much and thus causing a rough idle.

Piston blocks crankcase port, raising the chance of a backfire causing an explosion in the crankcase.

Testing the valve by shaking it to see if the internal mechanism is free (it will rattle) isn't a surefire method. The piston still might be partially clogged. To be 100-percent safe, replace the valve at tune-up time. The cost of a new part is little enough.

The 40 grain big game type bullet designed for your small game rim fire rifle.

For small game hunting, our new 22 Dynapoint® cartridge gives you a 40 grain long rifle bullet that combines accuracy with the most effective mushrooming you've ever known.

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probable causes of Jeep front end shimmy: incorrect tire pressure; incorrectly adjusted front-wheel bearings; worn, out-of-balance or out-of-round front tires; worn tie-rod ends; loose steering damper to tie-rod bracket, *worn or loose steering-knuckle ball studs;* and a *steering damper malfunction.* I've picked out the last two conditions for emphasis, because they require special attention if everything else you do to this point fails to relieve shimmy.

The front end has two ball joints which possess tapered studs that fit into tapers in the axle yoke. Studs may be adjusted in the upper tapers. The adjustment procedure is intricate and is explained in detail in the service bulletin. The condition is emphasized by me here because it is often overlooked as a reason for shimmy.

A special steering damper kit has been issued for Commando and CJ models that should be installed as a last resort. It is emphasized by me in the above list, because installing the kit is the absolute last step you should have done. If another thing I mentioned is causing the shimmy, putting the steering damper kit on the vehicle isn't going to help. You'll only be wasting time and money. The part number of the kit is 4351717, parts group 10.260.

Skeptic in my mailbag

Tell me, Mort, if you can, why my 1976 Thunderbird with 460-cu.-in. engine has suddenly developed rough idle and a deep noise from under the hood that my mechanic can fix only temporarily. He says the carburetor keeps coming loose and all he can do is keep tightening it. He has replaced the gasket. Bet this stumps you.—Brian Russell, Palo Alto, Calif.

How much? The 460-cu.-in. engine with an exhaust gas recirculation (EGR) system has had a habit of developing an exhaust leak between the carburetor and intake manifold. FoMoCo has issued a host of new parts that should be installed. If I didn't make it clear, this repair applies to *all* Ford, Mercury and Lincoln models with a 460 engine having an EGR system.

First, the carburetor should be removed and the following new parts installed:

■ Carburetor to carburetor spacer gasket—D7VZ-9C477-A.
■ A carburetor attaching stud—387544-S.

Next, the following newly designed parts should be installed in place of those parts originally put on the engine:

■ Carburetor spacer—D6VZ-9A589-C.
■ EGR valve gasket—D6VZ-9E464-B.
■ Carburetor spacer to intake manifold gasket—D6VZ-9447-B.
■ Carburetor attaching nut and washer assembly—387167-S2.
■ EGR valve attaching nut—382136-S.
■ EGR valve attaching nut—387296-S2.

EGR valve attaching nuts should be tightened to 12 to 18 ft.-lb. torque, carburetor attaching nuts to 12 to 15 ft.-lb. torque. Drive the car a few hundred miles and retorque the nuts.

So much for skepticism.

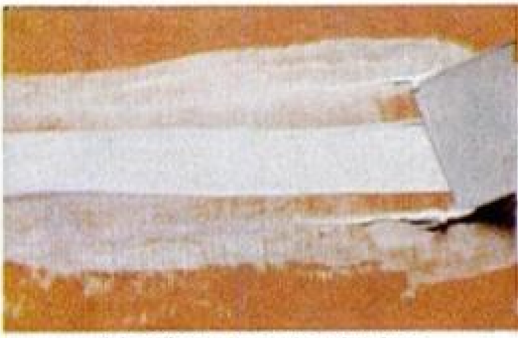
Rappin' the can

The oil filter in my 1968 Chevrolet Nova is stuck tight. I'm afraid of putting too much pressure on the wrench for fear of crushing the body. It occurs to me that this may be a common problem for amateur mechanics like myself and that you would do us all a favor by publishing a procedure.—J. C. Glaser, Columbus, Ohio

Put a pan under the filter and get

Please turn to page 56

BOTH OF THESE SPACKLING COMPOUNDS CAN FILL A HOLE. REDI-SPACK DOES IT RIGHT THE FIRST TIME.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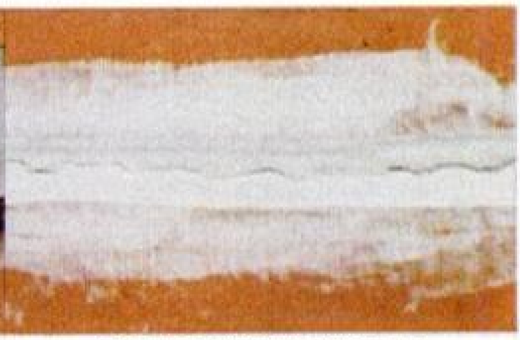
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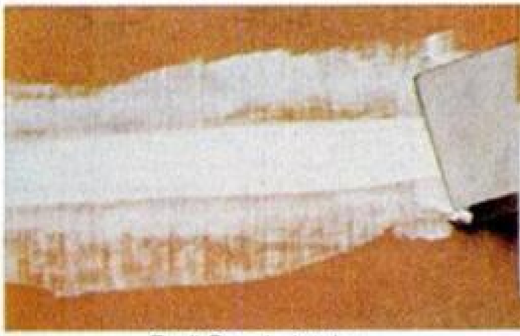
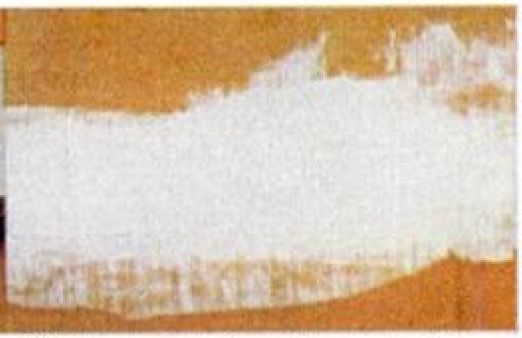

Redi-Spack, 1st time.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Redi-Spack™ is specially formulated to dry hard and resist shrinking and cracking. It comes ready to use, dries fast, and sands easily. You can even paint over it in as little as 15 minutes.

And since Redi-Spack is made from an acrylic latex base, it won't break down under latex paints as so many other spackling compounds do. What's more, it does not contain asbestos.

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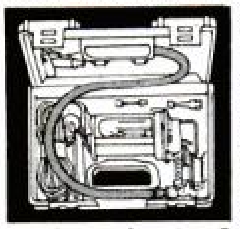
Coleman™ Inflate-All 90™

the mighty mini-compressor that pumps up to 90 p.s.i.-works off a 12V auto cigarette lighter!

It's the one with Coleman quality. The Inflate-All 90 brings the average car tire from "flat" to inflated in about 8 minutes. Maintain proper inflation, perk-up spares in emergencies.

It also inflates truck, van and RV tires. Bicycle tires. Air mattresses. Footballs. Basketballs. Dozens of other uses.

The unique valve stem lets you measure pressure while you're pumping. Optional 15-foot extension cord, or handy clamp-on battery clips are available for extra versatility.



The Inflate-All 90 weighs just 4½ pounds. Hose, power cord, everything stores inside the case for easy carrying.

Look for the Coleman logo at leading automotive departments and specialty stores. Or write to Coleman.

Coleman®

THE COLEMAN COMPANY, INC. • WICHITA, KANSAS

CAR CLINIC

(Continued from page 55)

ready for a little mess. Drive an awl, chisel or some other sturdy, sharp-pointed instrument through the canister near the base. Now hit the tool with a hammer to shock the filter loose.

That's the procedure. Now let me give you a little advice. Don't ever install a new oil filter with a wrench, and you will probably avoid this problem. New oil filters should be tightened by hand only. They don't need more pressure.

Creaky Cricket

Take my 1971 Plymouth Cricket, please. I recently bought it at a used-car lot, and it's been bugging me. If the engine doesn't catch first time out, it won't start at all. It just clicks, making cricket-like noises. Other than this the car performs well for a vehicle which has almost 75,000 miles on it.—George Davis, Milwaukee

I don't want your Cricket, George. You keep it. It may last another 75 Gs if you fix the trouble, which I think is caused by moisture entering the starter solenoid. This car and earlier-model Dodge Colts have been inclined toward the condition.

If I'm right, you can fix this by removing the solenoid from the starter. You don't have to take the starter off the engine. Clean the solenoid face, plunger and housing mating surface thoroughly. Make sure no corrosion remains. Now, seal the outer edge of the solenoid face and the mounting screws with sealer to keep moisture out. Use Chrysler starter brush sealer (2421838) or equivalent. Reassemble solenoid to the starter motor and try it. If the trouble continues, replace the solenoid.

Pacer's exhaust leak

We have had nothing but trouble with a 1975 AMC Pacer we bought in used condition (27,000 miles). Exhaust is leaking from under the car at the front, and the engine misses. The dealer has replaced the exhaust manifold gasket and tuned the engine. This didn't help. He then replaced the manifold itself and discovered that the old one was cracked. The new manifold held up for four months. Now the problem is back. Please help.—Jacklyn D. Massie, Fremont, Calif.

The exhaust manifold—a problem with the Pacer for some time—should no longer be a problem. The original factory-installed manifold was weak and tended to crack. AMC has issued a newly designed part cast differently and made substantially stronger. The company has assured me that the new manifold will be available by the time this issue is printed. Supplies of the older manifold have been recalled.

Make certain that whoever installs the new manifold uses brand-new attaching nuts and studs. Old fasteners should not be employed.

SERVICE TIPS

■ Volkswagen has instructions regarding the towing of its models using conventional sling-type tow-truck equipment. Make sure the truck's operator follows these rules to avoid severe damage to your vehicle:

1. Rabbit, Scirocco and Dasher with front-wheel-drive units and manual or automatic transmission have to be towed with front wheels off the ground. Beetle and the VW Bus with rear-wheel-drive capability and automatic transmission have to be towed with rear wheels off the ground.

2. If your car has automatic transmission, the selector lever has to be placed in "N" position. The car should not be towed farther than 30 miles or faster than 30 mph. If these limits have to be exceeded, a towing dolly should be used under drive wheels or the driveshaft should be disconnected.

3. If towing a car which has to have its rear wheels raised, front wheels should be secured with a steering wheel locking device. The ignition steering lock should never be used to secure the front wheels.

■ Maybe Chrysler Corp.'s hesitation problem with its 225 and 318-cu.-in. engines equipped with Carter two-barrel carburetor will clear up—now that a new accelerator pump cup and pump spring have been issued. The new pump cup has part No. 4049179. The new spring has part No. 3481313. If your 1977 car is under warranty, parts and labor will cost you nothing if you refer the dealer to service bulletins 14-06-77, which covers the pump cup, and 14-11-77, which covers the pump spring.

■ Any 1977 Ford, Mercury or Lincoln with 400-cu.-in. engine that has a driveway problem when first started (stalling, stumbling, hesitation) should have installed in it a CSSH. CSSH? That's Cold Start Spark Hold. The unit should be put in your car under the warranty. Authorization is given by article No. 1745, service bulletin 129.

■ AMC has a new address you should write in order to get a service manual and other data. It is AMC, Literature Distribution Dept., 37200 Amrhein Rd., Livonia, Mich. 48150. ★★★

GOT A PROBLEM WITH YOUR CAR?

Just ask Mort about it. Send your question to the Car Clinic, Popular Mechanics, 224 West 57th St., New York, N.Y. 10019. While letters cannot be answered individually, problems that are of general interest will be published in the column.

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DU PONT

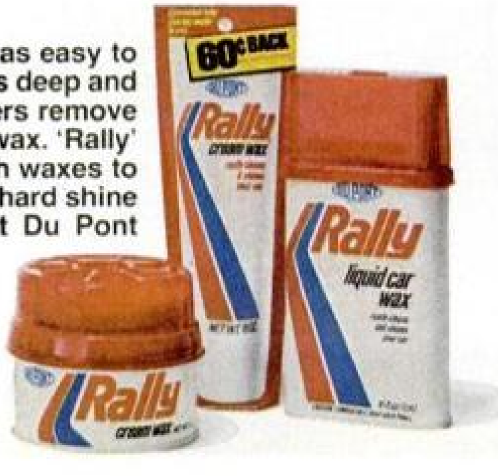
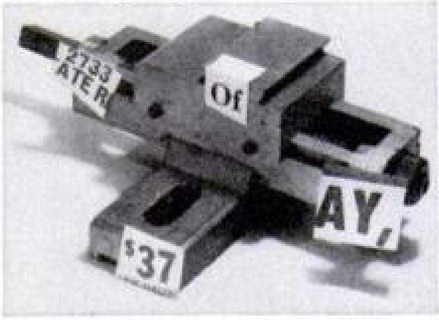


PHOTO HINTS

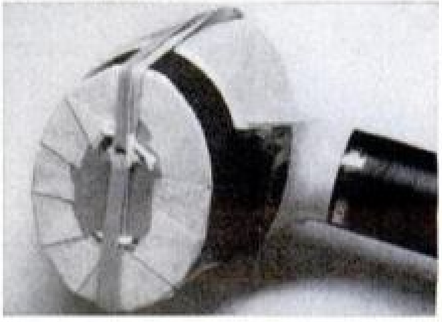
Focusing targets



It's hard to tell when your camera is focused for the sharpest picture —especially when adjusting a view camera to bring two or more parts of an object, at different distances from the lens, into focus. One reason: lack of contrast at the focusing points. Next time, clip pieces of newspaper headlines. Position them at the points to be focused. Double-sided tape will hold the clippings in place. A magnifying glass will make it easier to focus the letters clearly on your ground-glass screen. Be sure to remove the focusing targets from the scene before making an exposure.

—*Walter E. Burton*

Mallet strobe saver



Gear should be safe from damage yet ready for quick shooting. One easy-to-damage piece is the lens on your flash, especially on the popular mallet-style strobes. Protect the lens with a homemade cap this way: Trace the shape on heavyweight cardboard. Put masking tape on the edges for reinforcement. Punch four holes in the cutout for attaching rubber bands. Secure the loop of rubber bands to the cardboard with packing string. The result: a handy cap that keeps you from bashing the strobe lens in your gadget bag.—*Michael Betts*

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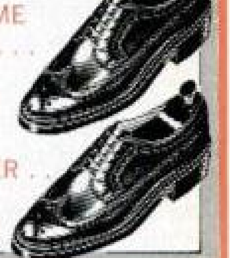

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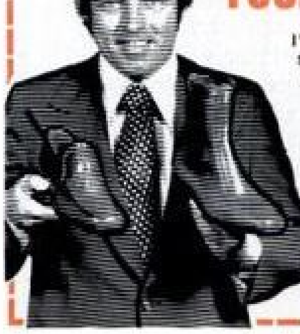

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DETROIT LISTENING POST

Tracking Ford's new mini

The follow-up car to Fiesta or Pinto coming in 1981 will be a little larger than Fiesta, a little smaller than Pinto. There's still some doubt which name Ford will use—Fiesta, Pinto or a new name. The car will be Ford's first U.S.-built mini, and my guess would be that the company will come up with a new name to go with the new vehicle.

Whatever the name, the new job will have a wheelbase of 95 inches and measure 155 inches overall. Fiesta has a wheelbase of 90 inches and is 147 inches overall. Pinto is built on a 94.5-inch base and measures 169 inches total.

Ford strong on V8 engine

Ford doesn't agree with GM that the V8 engine will fall victim to government demands that cars give better mileage. Ford plans to keep the Eight at least another seven years, until the mid-1980s, and possibly longer than that. Ford's future Eights won't be as large and powerful as today's engines, but the basic design won't change much. GM hasn't put out an official announcement that it will discontinue the Eight. But the emphasis on engine development at GM is on replacements for the V8—largely V6s. Ford is also engineering a V6 for its 1981 cars.

GM readying turbo Four

Speaking of the V6, if Buick's new turbocharged V6 (see Firsthand Report, page 40) makes as much of a hit with customers as it has with GM engineers, GM will apply the turbo principle to a Four. The company is already experimenting with a turbocharged Four, but hasn't yet given the go-ahead signal for production. First cars scheduled to use the turbo Four would be Chevy and Pontiac.

Shorter hoods for GM cars

GM feels it has gone about as far as it can go in reducing rear overhang on its cars and pinching the body in at the sides while still maintaining enough interior space to accommodate four or five people. So where do you trim next? On the next go-around GM will concentrate on compacting and removing weight from the front of the car.

Hoods will get shorter and have a much sharper forward slope. Engines will be mounted at an angle to make better use of space in the engine compartment and other components in the compartment will be downsized. GM is just getting into a major program to mini-size mechanicals in the engine compartment.

'Corporate' vans coming

Several months ago (Dec. '76) we mentioned that GM and Ford were kicking around the idea of bringing out "corporate" vans. Corporate meaning the vans would carry the name of the corporation and be sold by all dealers handling the corporation car line. Latest on this is that GM will bring out a corporate van in 1981. It will apparently be sold by all GM car and truck dealers except Cadillac.

This move is only remotely related to the jam GM got itself into when it was revealed the company was putting Chevy engines in Oldsmobiles. GM had been planning to go "corporate" on a number of products before that flap. Vans are the hottest ticket in town and GM wants all the sales it can get. The marketing experts—not just the GM guys, but those at the other companies, too—figure that van sales will top a million a year by 1980-81. A couple of years ago I predicted that American Motors would have a van by 1977-78. I was dead wrong on the year, but I stand by the statement that AMC will add a van to its catalog.

Gas goals within sight

The auto companies aren't telling the whole story when they say they can't meet the mileage standards the government has decreed for 1978 through 1985 cars. Starting with the '78s, fuel economy is supposed to improve year-to-year until it reaches a peak of 27.5 mpg in 1985. The companies don't want it known, but they are already halfway to the goal—seven years ahead of the deadline. They have the technology or the hardware to surpass 27.5 mpg in highway driving. That includes the biggest, heaviest cars made.

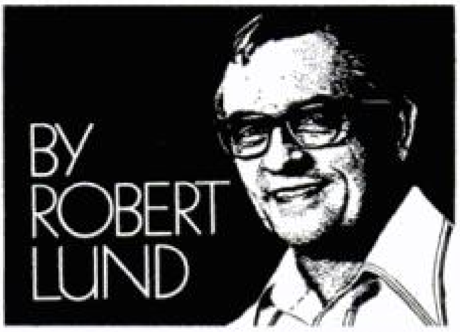
The problem is to improve fuel economy in city driving, stop-and-go driving, so the city cycle and the highway cycle average out to 27.5. If the mileage standard for 1978 cars (18 to the gallon) had existed seven years ago, Detroit would have said it was impossible to achieve. But it was achieved. Now the companies are saying the target seven years from now is impossible. Detroit is a great town for saying something can't be done and then going right ahead and doing it.

Etched in glass

If you've equipped your car with all the gear and gizmos available to protect it from thieves, don't kid yourself that it can't be ripped off. A company that makes tools for reposessors—the guys who come around and reclaim the car if you don't keep up the payments—has a kit out that will open almost any car and pull the steering column lock. The kit sells to these pros for less than $200.

A few years ago when Ford had a reputation for having the easiest cars to steal, including mine, a Ford engineer told me there's no way of protecting a car against all possibility of being swiped. A Chrysler engineer told me the same thing. The companies have improved locks and security devices, so the crooks have to work harder. But if they want the car badly enough, they will find a way of circumventing any antitheft device you can put on it.

The best theft deterrent I've heard of is to have the serial number of the car engraved on all windows. This is a fairly expensive proposition and a crook can still make off with the car. But he will have to have the glass replaced and that runs about $600 to $800. Seems to me a thief would look for another car before taking one with the serial number on the glass. But I'm no expert on how automobile thieves think. ★★★



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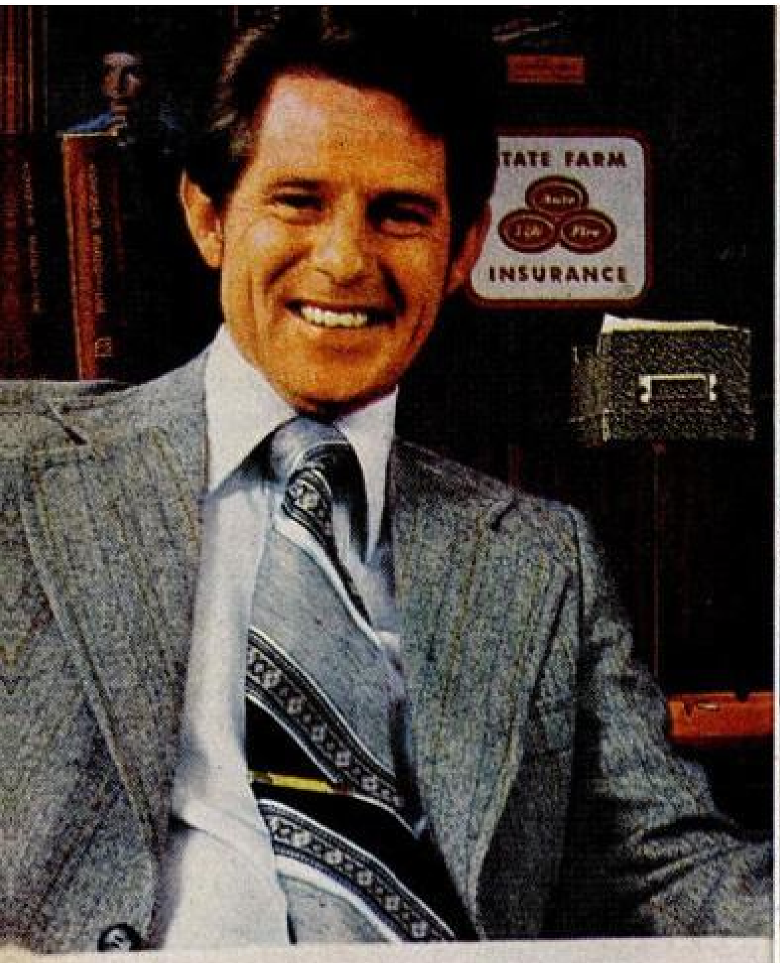
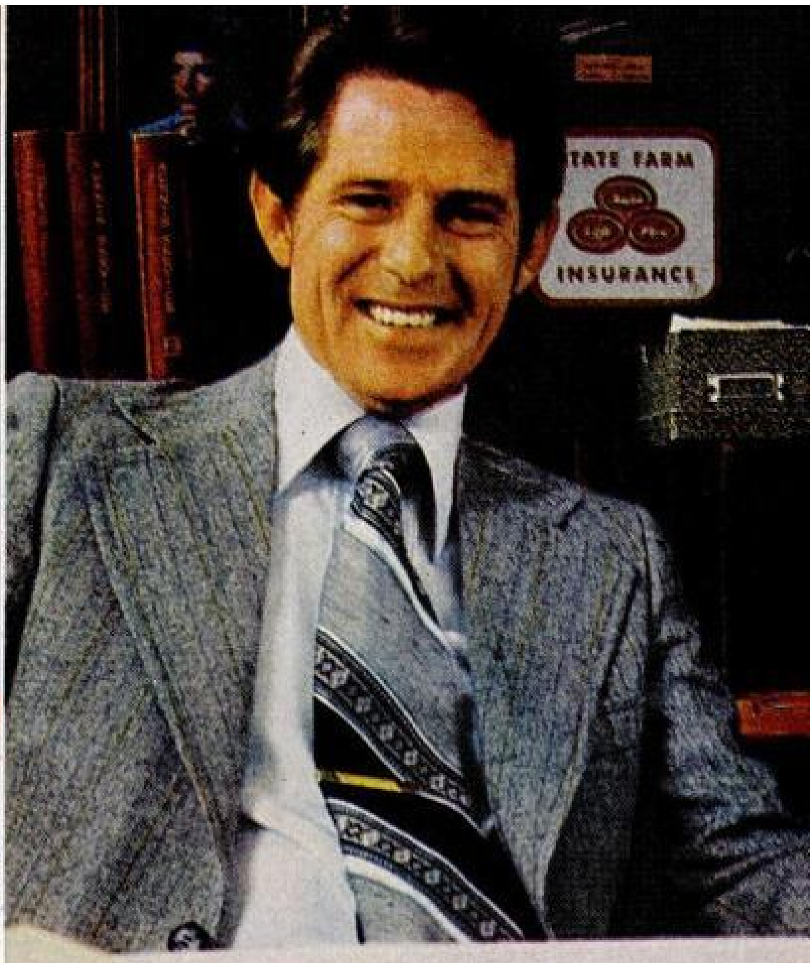


State Farm Life Agent Ken Clark



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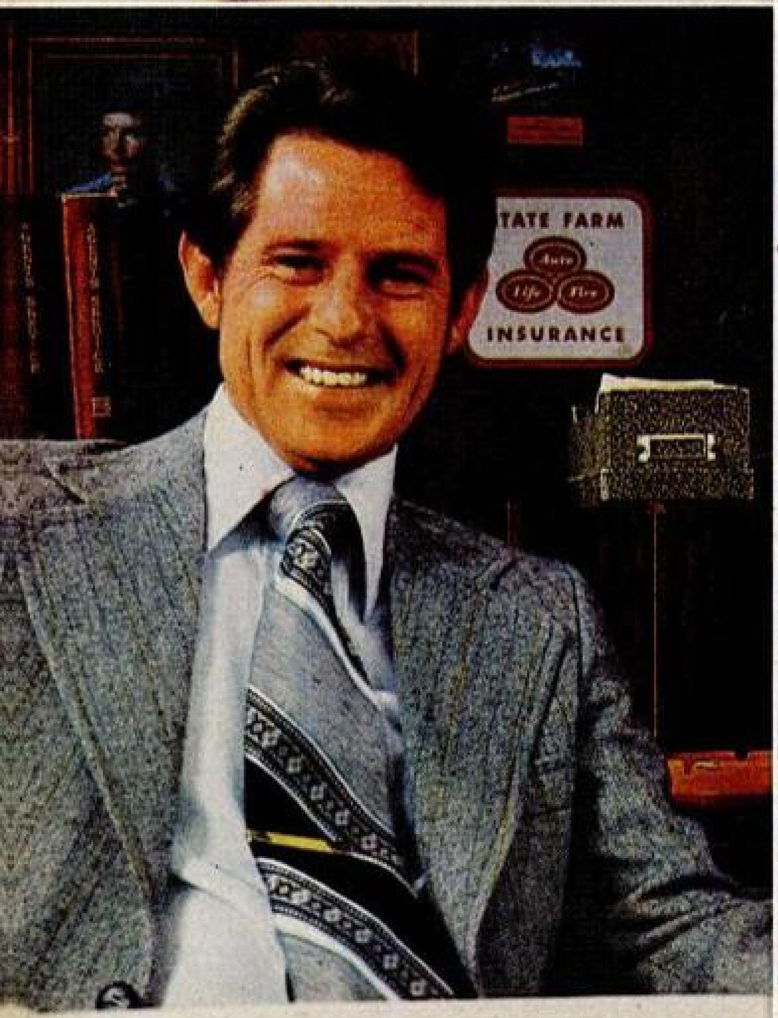
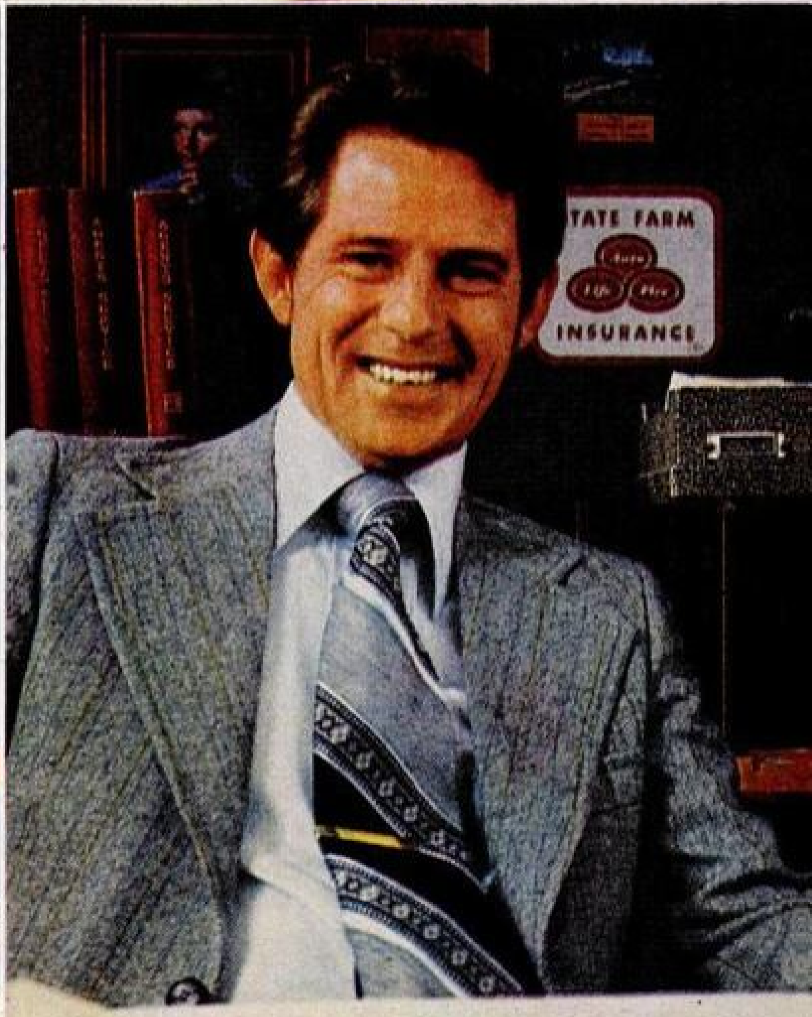
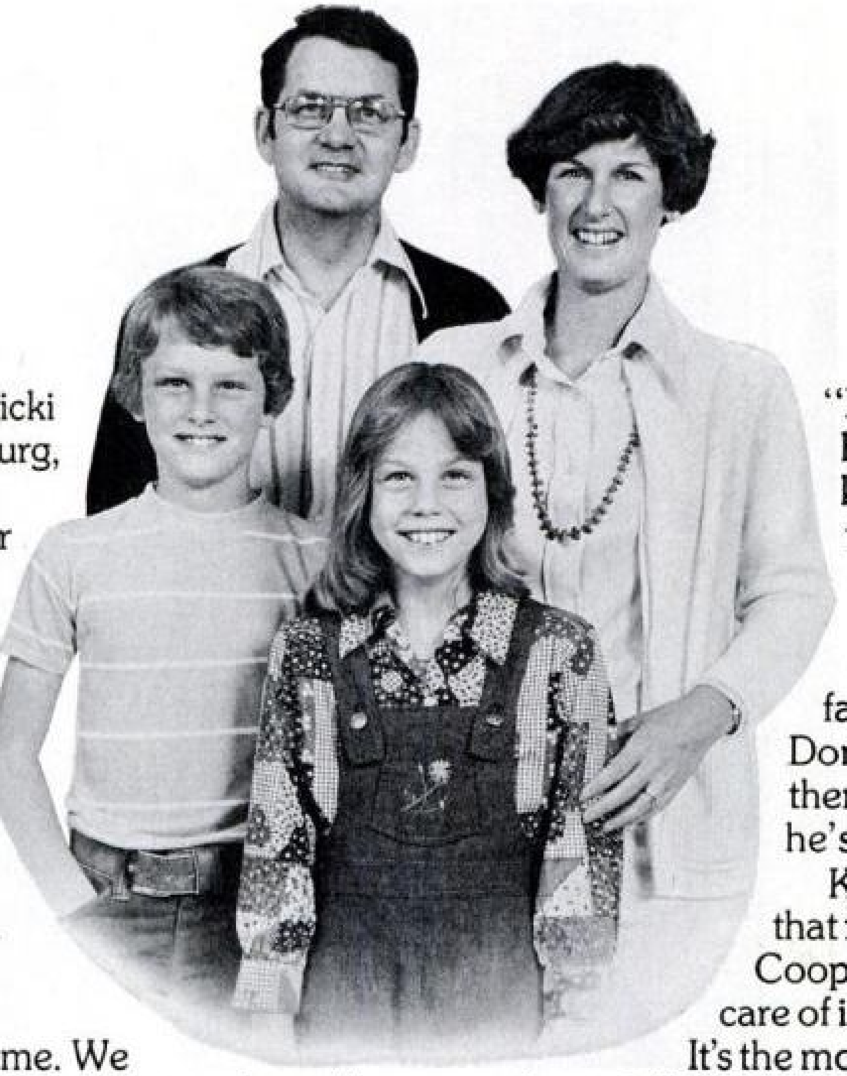


State Farm Health Agent Ken Clark



State Farm Homeowners Agent Ken Clark

There are four good reasons to see your good neighbor agent.



When Don and Vicki Cooper of Roseburg, Oregon, bought insurance for their home from State Farm agent Ken Clark, one thing led to another.

"I liked the coverages and felt good about being with State Farm," says Don. "But most of all, I liked the way he treated Vicki and me. We could tell he had our interests at heart."

Later, the Coopers decided to make Ken their life insurance agent. And then, their auto agent, too.

"It's a great convenience to have one agent handling the family insurance," says Vicki.

"If anything should happen, it's nice to know that all I have to remember is one name."

"And when you call him, you get a fast response," adds Don. "You know he's there, and you know he's working for you."

Ken says, "Knowing that families like the Coopers are well taken care of is very satisfying. It's the most rewarding part of my job." There's a State Farm agent like Ken Clark in your neighborhood.

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Bold new tactics for fighting high-rise fires

by Ted Dutton

Imagine you're on the 35th floor of a 50-story skyscraper. It's late in the afternoon on a Friday and office workers are getting ready to pack up and head home to enjoy the weekend. Suddenly there is the faint hint of smoke—something's burning. A few wander off to investigate, but there's no real concern—the building, after all, *is* fireproof.

Then it comes, without warning. Thick, black, choking smoke pours into the area, catching many still at their desks. Outward calm turns instantly to open panic. There is a mad rush for the exits. Some are overcome on the spot, felled by poisonous fumes or superheated air that withers lungs. Some are trapped helplessly in stalled elevators. Others are trampled in the crush of overcrowded stairwells.

Flames spread rapidly

Flames race through ventilation ducts and other openings that act like fireplace chimneys, allowing the fire to spread rapidly from floor to floor. Arriving firemen are unable to reach the blaze because of clogged stairwells and inoperative elevators. Within a very short time the fire is hopelessly out of control. The building becomes a raging, terrifying, towering inferno. The grim business of making a body count will come later. . . .

Okay, cut. Now let's look at the scene under somewhat different conditions. It's the same floor in the same building on the same Friday. Thin wisps of smoke curl upward from an as yet unnoticed fire. Before employees are even aware of any danger, supersensitive smoke detectors "smell" the start of combustion and instantly sound an alarm. From here on, a lot of strange and unusual things happen in quick succession.

Modern fire-control methods

As the smoke detectors are triggered, they simultaneously set off an alert at the local city fire department. Ceiling sprinklers come on, blanketing the fire area with a heavy spray of water.

Down on the ground floor, in an electronic maze that looks like a space-age military command post, lights flash on and bells clang. This is the building's nerve center—the fire-control room. On a wall-size screen is displayed the structure's profile, floor by floor, pinpointing the

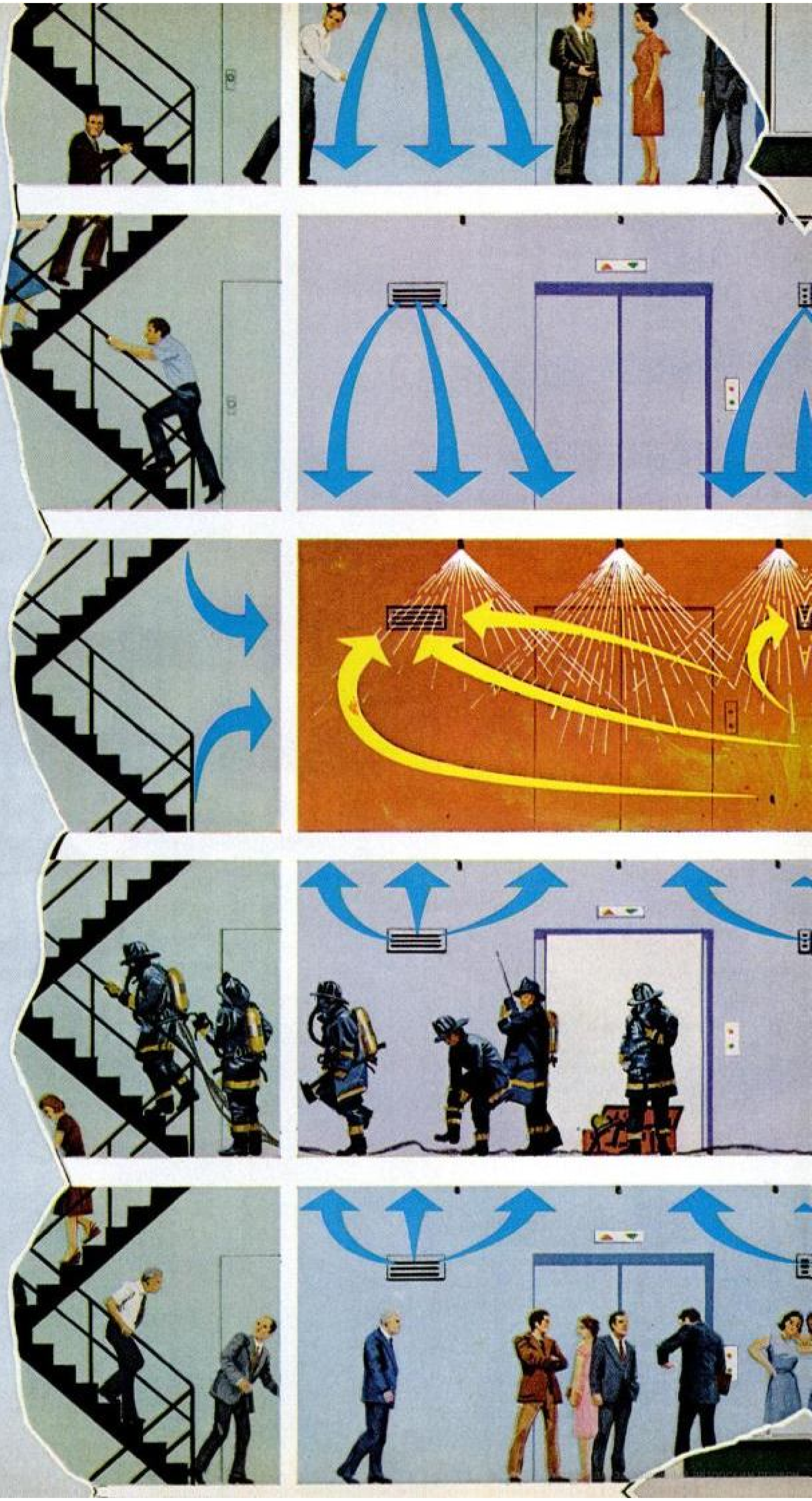
Almost like in the movies, flames engulf upper floors of 32-story Occidental Tower in Los Angeles last fall. Luckily, blaze occurred at night with building empty, but it took 50 fire companies to put it out.

Fire-safe area: Occupants on floor above fire floor move calmly to next level up as advised by prerecorded tapes over public address system. No attempt is made to evacuate building to avoid danger of people being trapped in elevators or in jammed stairwells. Fresh-air blowers on floors above and below fire floor are put on full power to "pressurize" surrounding area and keep smoke from spreading. Exhaust vents on fire floor draw off smoke and heat, helping to cool fire.

On fire floor sensitive smoke detectors sound alarm at first sign of combustion. Alarm simultaneously summons aid from city fire department and alerts fire-control command post on ground floor. Automatic sprinklers spray fire to cool and contain it until firefighters can arrive on the scene.

Firemen's staging area is set up on floor below fire floor. Here firefighters assemble equipment, get instructions from fire-control center on type of blaze, location, how best to approach it. Firemen take elevators to this point, but walk up last flight to fire floor. This avoids the chance of elevators becoming trapped between floors or opening onto unknown fire situation.

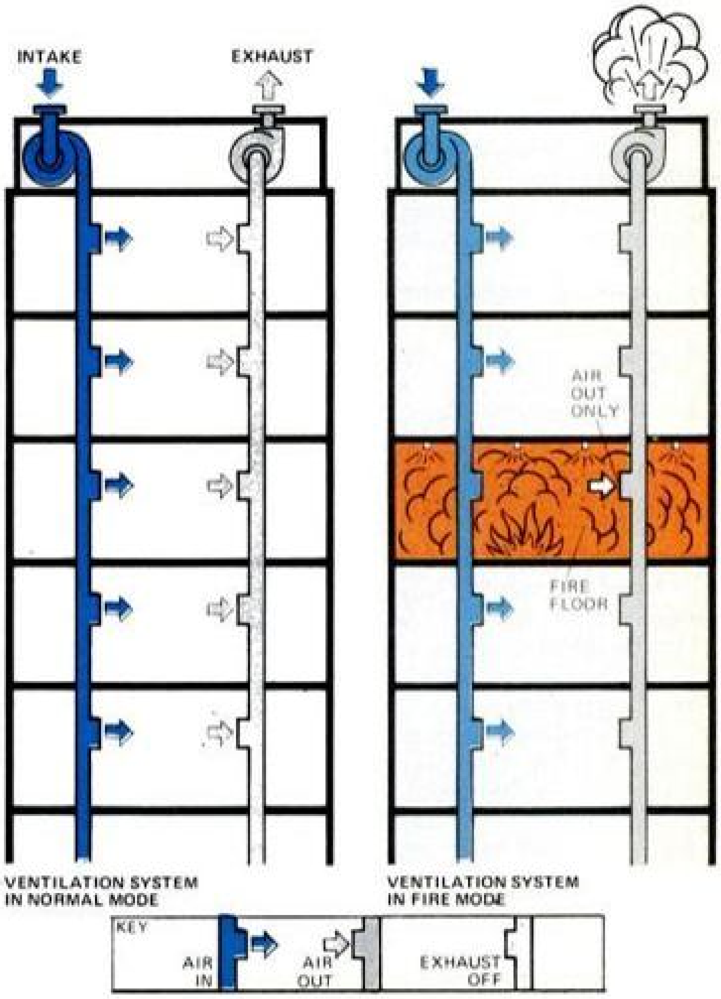
Occupants from fire floor are directed to move two levels below. Again, there is no attempt to evacuate building. All elevators are automatically "captured" and returned to the ground floor for use by firefighters. With blaze contained on one floor, it is quickly extinguished without a major disaster.



exact location of the fire. Other screens portray floor plans of the "fire floor" and adjacent floors to show the layout of the areas involved and help determine how best to approach and isolate the blaze. A computer calculates the extent, intensity, type and probable course of the fire according to the number and location of sensors triggered.

Prerecorded tapes direct employees in a soft, calm voice to go to fire-safe areas over a public address system. In most cases, occupants are asked to move *up* two levels above the fire floor and down two levels—no more. There is no attempt to evacuate the building, thus keeping the stairwells free of panic-causing jams. The floor immediately below the fire floor is cleared and designated as a "staging area" for firefighters.

People in elevators may be in for a surprise—they will never reach their floors. At the first sound of alarm, all elevators are automatically "captured"—they return to the ground floor and are held there. This prevents their use by employees who might become trapped in them and also makes the cars available to firefighters



Fire-control center in modern high-rise building is equipped with TV monitors and computer readouts to locate blaze and immediately activate fire-safety measures. Installation at right is by Honeywell, one of largest makers. Diagram above shows positive and negative pressure systems to help contain fire.

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HIGH-RISE FIRES HAVE CLAIMED OVER 500 LIVES IN

for fast movement of equipment to the staging area.

The building's ventilating and air-conditioning systems also do some odd tricks. On the fire floor, all fresh-air inlets snap closed, while exhaust vents are kept open and their blowers put on full power to create a "negative pressure" state. This draws off smoke and heat without letting in any fresh oxygen for the fire to feed on.

Meanwhile, on levels above and below the fire floor the procedure is reversed. Exhaust vents are closed and inlet blowers put on full power to create a "positive pressure" state. Pressurizing areas surrounding the fire floor helps to keep the blaze contained and the smoke from spreading. For the same reason, stairwells and elevator shafts are also pressurized.

As a result of all these prompt and ingenious safety measures, the fire is extinguished quickly, quietly, efficiently. There are no deaths, no injuries, no panic. Everybody goes home to enjoy the weekend.

No 'fireproof' skyscraper

This is not just a make-believe Hollywood scenario with a happy ending. It's an actual sequence of events that could take place today in many new high-rise buildings equipped with the latest in sophisticated fire-control aids.

Fire-safety experts have long realized that there is no such thing as a truly "fireproof" skyscraper. No matter what the basic construction is, too many flammable materials go into it to make it safe from fire—wood furniture, wall paneling, drapes, upholstery, carpeting, to say nothing of the tons of paper supplies and trash that seem to fill every office.

Nor is it practical to evacuate such a structure during a fire. A 40 to 50-story giant contains thousands and thousands of occupants. It would literally take hours to get that many people out—and fire doesn't wait that long.

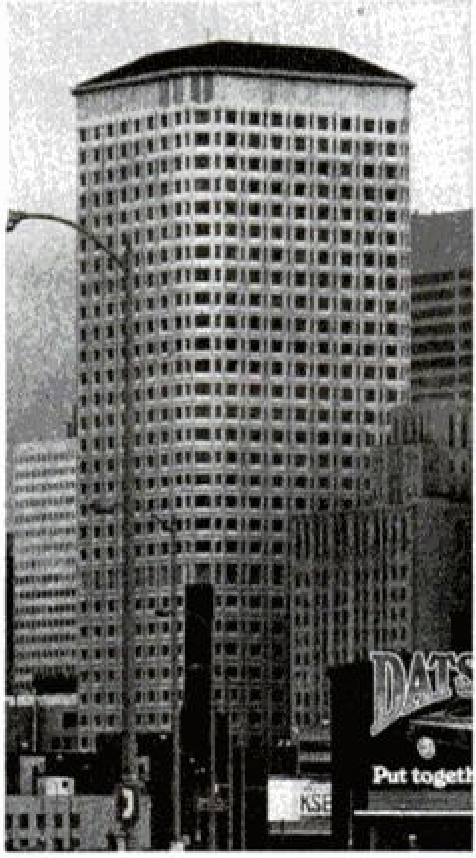
To complicate matters, even the tallest aerial fire ladders reach only to about the 7th to 10th floor—not much help in fighting a fire on the 40th or 50th floor. This means that most high-rise fires today must be fought from *inside* the building, not outside.

All these problems have led fire-safety experts to concentrate on developing new systems of fire-*containment* rather than relying on fire-proofing. While there have been no skyscraper fires quite as devastating as that depicted in the famous and frightening movie, *The Towering Inferno*, there have been enough to indicate the fearsomeness of the menace—that high-rise structures can, and have, become death traps.

Serious fire hazard

Denver Fire Prevention Chief Ken Neville calls the danger "the nation's most serious single fire hazard." The United States alone experiences an average of 3000 high-rise blazes every year. Fortunately, most of these are relatively minor and do not involve loss of life, but the sheer number shows the potential for disaster. Just last fall, fire gutted the upper floors of the 32-story Occidental Tower in Los Angeles—luckily at night when no one was in the building. Not so luckily, recent high-rise fires have taken the lives of 119 in Atlanta, Ga., 25 in Montgomery, Ala., 28 in Tokyo, Japan, and 163 in Seoul, South Korea. The greatest recorded multistory tragedy occurred only three years ago in 1974 in Sao Paulo, Brazil, when fire flashed through a faulty airconditioning system in a modern bank building, killing 189 in 25 minutes.

The buildings involved in these deadly fires were sleek concrete-steel-and-glass structures typical of the tall, shiny towers going up all around us today. But there's a difference—things are changing. New laws are being passed requiring advanced fire-protection systems for tall buildings. Older laws called for a building's structure to be "fire-resistant," but they didn't provide for making the occupants equally fire-resistant.



Seattle (Wash.) Federal Building, built by U.S. General Services Administration, is model of modern fire-safe construction.

Buildings less safe today

Ironically, fire-prevention experts have been warning for years that new methods of high-rise construction have actually *increased*—rather than decreased—the perils of skyscraper fires, pointing out that many of our mammoth towers, instead of being fire-safe, are in fact "highly efficient furnaces."

Tall buildings constructed from 1900 to World War II were relatively well protected. They had external walls of brick or concrete and permanent interior partitions that divided floors into many segments and provided effective fire barriers. During nearly 50 years fire losses and fatalities were low.

But in the postwar period, architects switched to what is now called "tube construction." New skyscrapers supported their loads on steel frames with light metal exterior sheathing, sometimes almost all glass. Permanent ceiling-high interior walls gave way to low, movable partitions, leaving large, open loft spaces for fire to flash across quickly. Steam heating was replaced by a maze of sheet-metal ductwork passing from floor to floor for forced-air heating, cooling, ventilation and other needs.

The 'chimney' effect

Utilities—including the elevators, stairways, plumbing, air shafts and wiring—were all concentrated in a central "core," providing a perfect "chimney" effect. Walls and floors were riddled with "poke-throughs," also for ductwork, cables and piping.

With all of these holes, shafts and other openings, it is no wonder that it is difficult to maintain "structural integrity" in a modern high-rise against the spread of fire and smoke. Spaces left between floor slabs and exterior walls can become "flues" to carry flames rapidly upward to other levels, along with the many other vertical shafts and ducts. A powerful "stack effect" can be created by rising heat within a structure. Temperatures can reach fantastic levels—up to 2000° F. Expanses of

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RECENT YEARS

glass can shatter in the intense heat, or thin curtain-wall sections can melt or buckle, thus permitting fire to roar up the *outside* of the building.

If a fire races rapidly upward from floor to floor, it can quickly become a "runaway," with firemen powerless to stop it. Also, many new building and decorative materials, while they may not burn with an open flame, will smolder and char, giving off dense smoke and acrid fumes—often more deadly than fire itself. Government statistics indicate that more than 80 percent of fire victims die of smoke poisoning rather than burns, or at least are dead of inhalation before flames reach their bodies.

Early warning is vital

It is for these reasons that today's fire-safety experts are putting their efforts on containing a fire to keep it and its lethal fumes from spreading. Early-warning smoke detectors able to sense virtually invisible particles of combustion, often before a fire even reaches the flames stage, are now being installed in many new buildings—not only office skyscrapers but high-rise apartment complexes and hotels, too. Antiquated heat-sensitive call buttons on elevators often brought the cars right to the fire floor and held them there, are being discarded. In the newest systems, elevators are equipped with electronic "recall" or "capture" devices that automatically return them to the ground floor in the event of fire.

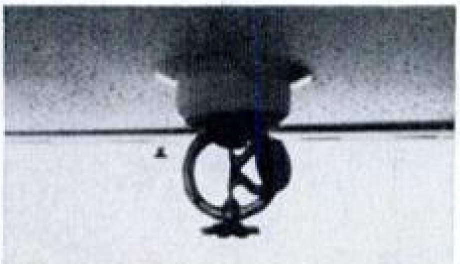
It's hard to believe, but little attention was paid to the problem of high-rise fire safety until about 1970. Then a sudden rash of U.S. fires—in New York City, New Orleans, Atlantic City, Tucson, Chicago and elsewhere—triggered a move to action. Many states and cities have now adopted, or are considering, new high-rise building codes for the first time incorporating extensive life-safety provisions. The time may not

(Please turn to page 198)

Tragic fire in Sao Paulo, Brazil, killed 189. Note ladders, hoses reach only lower floors.

Battalion chief uses fire-control center to direct firemen on upper floors. From here he follows extent, progress of blaze.

Motor-driven dampers automatically open, close during fire to control airflow—air out of fire floor, air into other levels.



"Old-fashioned" ceiling sprinkler has become one of latest ways to cool and contain fire until mobile apparatus arrives.

People trapped in this building in New Orleans in 1972 were forced to leap in desperation, resulting in several deaths. Though structure, Rault Center, was only 16 stories high, firemen were hampered by heavy smoke and rapid spread of fire.

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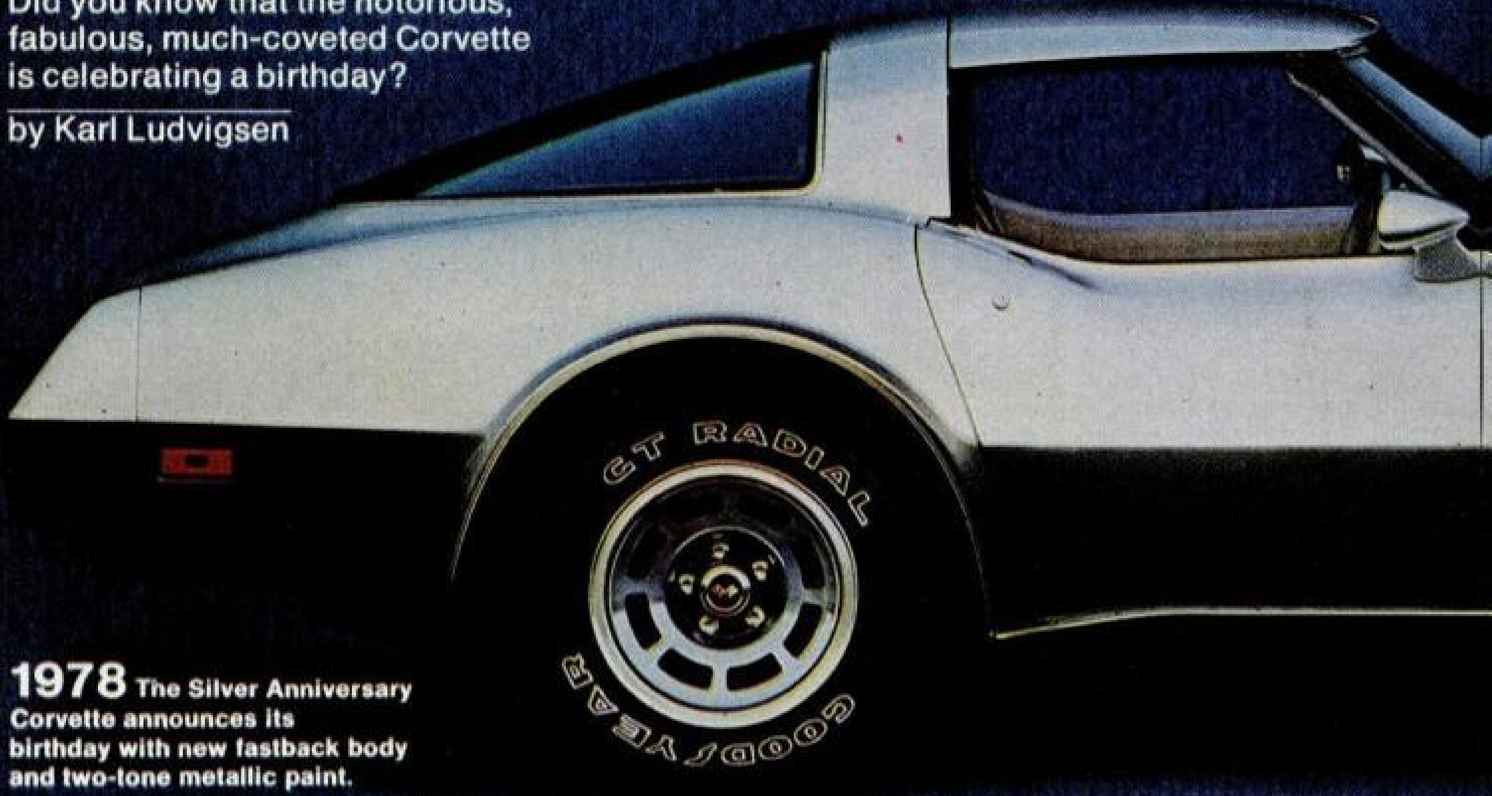
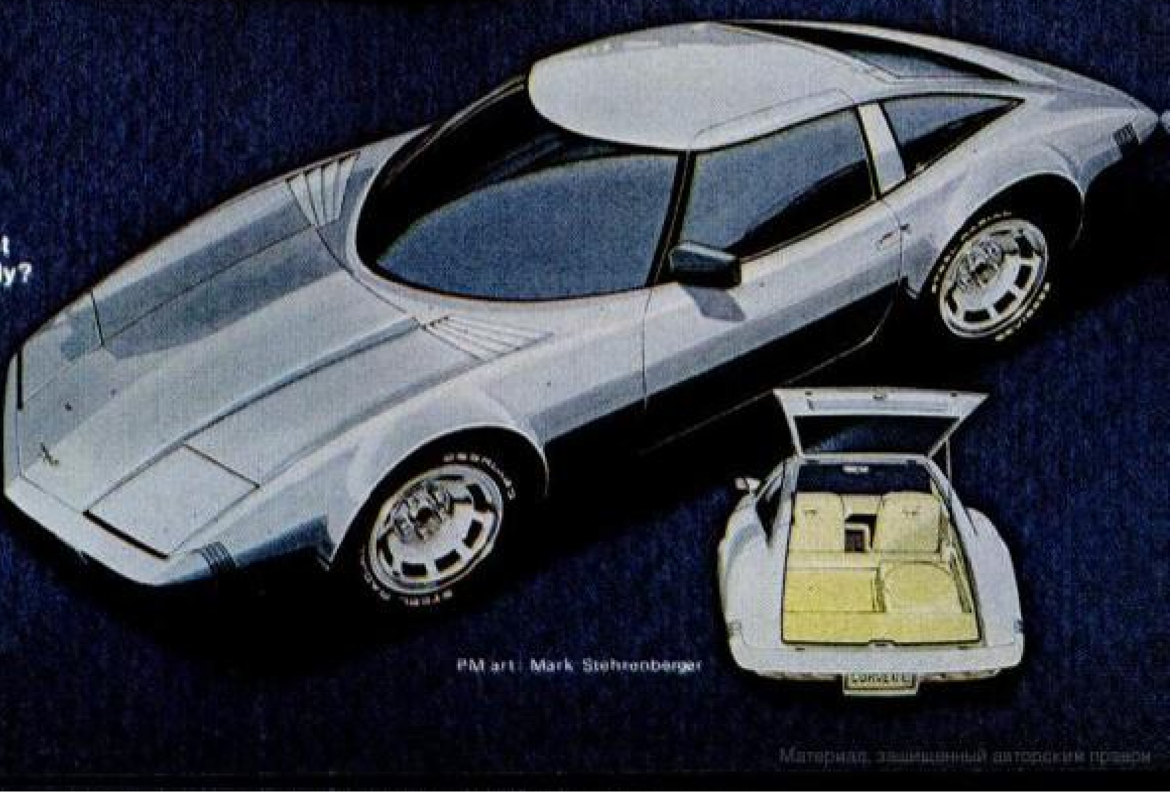
25 years on the most-wanted list!

Did you know that the notorious, fabulous, much-coveted Corvette is celebrating a birthday?

by Karl Ludvigsen



1978 The Silver Anniversary Corvette announces its birthday with new fastback body and two-tone metallic paint.



1981 Will Corvette get an all-new hatchback body? Will it get a V6? Will it be mid-engine? Read on!

PM art: Mark Stehrenberger

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1953
The first Vette.

Other American sporty cars have come and gone. Remember the Dodge Challenger, Plymouth Barracuda and AMC Javelin? If you're as old as I am you may even recall the Studebaker Hawk, Nash-Healey and Kaiser-Darrin, not to mention the original two-seat Thunderbird. These have sprouted and then faded like dandelions while one hardy peren-

nial, the Chevrolet Corvette, has bloomed in greater numbers each spring. Now the Corvette is in its 25th year. Its secret? It was and is, I think, the sportiest one of them all. Even though the St. Louis factory where Chevrolet builds the Corvette is working two shifts plus overtime, and every other Saturday, it can't meet the demand for these cars. Ask any dealer how many he's sold and he'll say, "I could have moved twice as many if I could have gotten the cars." In the 1977 model year, which will run a few weeks longer than normal, St. Louis will build more than 48,000 Corvettes. They have all been spoken for long before they're built. They'll go to the one-third of Chevrolet's 6000-plus dealers who are active in the Corvette market, and those dealers will offer each other as much as $1500 over wholesale to get any loose cars that may be floating around.

Even through the sag in auto sales after the Arab oil embargo, Corvette demand raged unchecked. There was never more than a 15 to 30-day supply out in the field, a very small inventory by industry standards. Why, then, doesn't dollar-conscious General Motors gear up to make more of them? This was suggested a few years ago. The figure of 100,000 a year was proposed; it seemed likely they could all be sold. But cooler heads counseled against it. "Part of the demand for the car is based on its very exclusivity," they argued. "Take that away and the sales will suffer in the long run." They won out, and the Corvette has stayed a prized possession of the few and a dream car for the many.

In 1978 Chevy is even enhancing the limited-production aspect of the Corvette. A special Silver Anniversary model will be offered with a handsome two-tone paint scheme. The upper surfaces will be a light metallic silver, and from the side break line of the body downward, including the wheel flares, a darker charcoal silver metallic will be used. Darker pinstriping will follow the edges between the two colors and also highlight the hood bulge. All the '78 Corvettes will have emblems on the front and rear and on the horn button that specially celebrate the car's 25th year. And these aren't even the most important novelties for 1978. In fact, the new Corvette features the biggest single change in the shape of the body since the current basic body was introduced back in 1968. Instead of a notchback, it's a fastback, which brings to the current car one of the most popular features of the Sting Ray coupes of 1965-67. There's no separate hatch in the back to get at the luggage space, but Corvette chief engineer Dave McLellan points out that it's surprisingly easy to swing suitcases in if you lift out one of the removable roof panels. Technically the luggage space is only slightly larger than it was before, but it's shaped more usefully and you can pile its contents higher if you want to. A window-shade-type cover pulls forward and latches at the front to hide the luggage from covetous eyes.

The new roof was just part of a big change to the whole rear of the body, "retooled from the door to

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the bumper," says McLellan. The fuel tank, a polyethylene plastic cell inside a steel container, is new with a much larger capacity: 24 usable gallons. McLellan found room for it using a spare tire, mounted under the tail, that's two inches narrower when inflated than the Corvette's standard tire. This gets away from problems of a space-saver spare, such as what to do with the flat tire, which in this case will fit the spare-tire carrier. There's even a new

1963 Corvette offered two models: a convertible and this Sting Ray Coupe.

courtesy light under the rear bumper so you can see what you're doing when you change a tire at night!

Standard on the '78 Corvette is a GR70-section radial tire—and optional is something new, a lower and wider HR60-section Goodyear GT radial tire. This has an Aramid fabric belt construction. The Corvette crew worked closely with Goodyear to get the design they wanted. The result, says McLellan, "has turned out to be a super tire." He's very high on its stability and road grip.

When you climb into the Silver Anniversary Corvette—any one of them—you find many more changes. There's lots more soft trim and carpeting, even on new door panels, right out to a narrow doorsill. A completely new dash matches the new console installed last year. It features a glove compartment for the first time since 1968 (braces needed by the convertible model, since dropped, were in the way before). Inside the compartment can be dividers for stereo tape storage. All warning lights are grouped at the center of the new speedometer-tach cluster and wired by printed circuits. Reading to 140 mph, the speedometer defies GM's recent policy of maximum figures no higher than 80 mph.

Under the hood the base V8 engine will produce 186 net horsepower and the optional Eight, the L-82, will be rated at 220 hp or better. Though the engine isn't changed, the Corvette men help it pump out more power as it's installed by adding a second cool-air inlet to the air cleaner, good for eight more horses, and by enlarging the exhaust pipes and fitting low-restriction mufflers.

Performance, looks, interior space, trim quality—things that count—have been improved in the '78 Corvette. It's been that way almost every one of the Corvette's 25 years. There have been setbacks, to be sure. Those who love brute power still miss the fuel injection and the 427-cubic-inch engines that used to be offered. Not many people actually bought those engines, though, so they're no longer part of the range.

Racing Corvettes, '61 racing Sting Ray here, established respect for the marque.

The convertible model vanished after 1975 for the same reason.

Twenty-five years of fidelity

Fans of the modern Corvette sometimes like to contrast it with the original 1953 model. "It's so much more advanced," they say, "in its styling and engineering." I take a different view. To me it seems the Corvette principle has remained amazingly constant over the car's lifetime, especially when you look at what's happened to other cars. Compare a 1953 Chevrolet sedan with today's Impala or Caprice, for example. Now *there's* a difference!

In comparison, the Corvette has remained true to its original principles. That's very unusual in Detroit, where a respect for tradition is rare. The Corvette has never deviated from its role as an out-and-out two-seat sports car, the only one made by a major American auto producer. It has never compromised, never tried to be a two-plus-two, never lowered its standards or diffused its image to try to be more things to more people. Though it has made use of parts from production Chevrolets, the Corvette chassis has always been designed from the ground up to suit that car's special needs as a sports car: engine well back for good weight distribution, low center of gravity, responsive steering, controllable handling. In these respects the 1978 Corvette is exactly like the 1953 model. Only the looks differ slightly.

The nerve to gamble

Looking back, what seems most amazing to me is that GM and Chevrolet had the nerve to gamble on the building of a two-seat sports car back in 1953. I say that because Detroit automakers are not known for eagerness to try totally new things, and the true sports car, with engine and passengers set well back

1956 Corvette, modified for racing, at Daytona with John Fitch at the wheel.

on the chassis, was a type of car virtually unknown in the United States. Building a car that could carry only two people, sitting practically on the ground, was thought silly by American automakers.

There were some very early examples, of course. The Mercer Raceabout and Stutz Bearcat were two-seat sports cars, for sure. But after World War I, American car companies had no time for such follies. Many two-seat roadsters, sporty open bodies built on normal chassis, were clearly not sports cars in the sense the Corvette was and is. So there was really no precedent for cars like Corvette in America in the 1950s.

Foreign sports cars—the Jaguars and MGs that became so popular here after World War II—helped spark the Corvette design. Surprisingly, so did the Willys Jeepster, an appealing and inexpensive open car. These were some of the cars that GM's chief stylist, Harley Earl, described to his designers late in 1951 when he asked them to start thinking about a sports car. A designer-engineer on his staff, Bob McLean, chose the low proportions, with the engine set well back, that made the Corvette a true sports car. And Chevrolet engineers, under the enthusiastic direction of Ed Cole, built the special chassis needed to go with that distinctive long-hooded look.

The first Corvette's long hood and short rear deck were doubly noteworthy in 1953, because they ran counter to the styling trend Earl was

(Please turn to page 152)

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Where Corvettes are concerned, there are no shades of gray. America's only mass-produced sports car is the stuff of which Hollywood fantasies are made. Owners likes are strong and so, we discovered, are their dislikes. In fact we have to conclude that for many owners of 1977 Corvettes a love-hate relationship with the car prevails.

An Iowa physician put it well: "My childhood dream of being an owner of a new Corvette came true after 28 years of hard work (in order to afford it) and study. But little did I realize that it would take several additional months after delivery just to get it into proper running condition and appearance." Many owners love their Corvettes. Many others vowed never to buy another one. Between these extremes we found the typical 1977 Corvette and its owner.

Four out of five owners were 39 or younger, and the highest concentration was in the 25-to-29-year bracket: 27.8 percent. The age patterns of our Corvette owners matched almost perfectly the demographics for buyers published in a recent SAE paper by David McLellan, chief Corvette engineer. Said McLellan, "The median Corvette buyer is 30 years old. This is much younger than the median age of the total new-car population, which is about 40 years." They were also just starting their families. Sixty percent of the owners whom we interviewed were either single or married with no children.

A surprising number were not new to the Corvette. For 53 percent of the buyers, their 1977

PM OWNERS REPORT: CORVETTE

A NATIONWIDE SURVEY BASED ON 856,000 OWNER-DRIVEN MILES

by KARL LUDVIGSEN

The new, 1978 Silver Anniversary Corvette with its fastback design will go on sale this month. Our survey is of owners who registered their 1977 Corvettes in January of this year. Used-car tip: The '78 model will certainly prove irresistible to Vette fans and put lots of late-model machines up for sale! Be on the lookout!

model was not their first Corvette. Every model year since 1956 had been owned at one time or another by one or more of our respondents. Cited most often were the 1973, 1974 and 1975 models, an indication that the owners of these model years were most likely to be trading in their cars, after two to four years of use, on a '77 model. And some owners had had many Corvettes. "My 1977 is my seventh Corvette," said a Wisconsin paramedic, "and I'm 22 years old. I just love it: handling, performance, looks, resale—it's all there."

By the time they answered our questions, these owners had driven their Corvettes an average of 4000 miles apiece. The three-quarters of them who had automatic transmissions reported that their gas mileage averaged 12.9 miles per gallon in town and 16.6 on the highway. The mileage figures for the cars with four-speed manual transmissions were a little better: 13.3 in town and 17.3 mpg on the highway. Though a few owners felt the mileage should be better, amounting to 7.7 percent of those responding, most felt it was all right in relation to the car's performance.

The largest number of these Corvettes, 42.3 percent of them, were members of two-car auto families. They were the owner's only car in 31.2 percent of the cases surveyed. The rest were in multicar families, including one with no less than six cars. And among the other cars owned, Chevrolets were in the majority (54.1 percent). Clearly the Corvette is a happy marketing match for the other cars in Chevrolet's line. At much lower levels of popularity were, in order, Oldsmobiles, Fords, Pontiacs and Buicks.

(Please turn to page 190)

SUMMARY OF 1977 CHEVROLET CORVETTE OWNERS REPORTS*

Total miles driven 856,029

Average miles per gallon
- 350-cu.-in. V8 (4-sp. manual)
  - In town (EPA manual 14) 13.3
  - Long trips (EPA manual 18) 17.3
- 350-cu.-in. V8 (automatic)
  - In town (EPA autom. 15) 12.9
  - Long trips (EPA autom. 20) 16.6

Why did you choose the Corvette?
- Styling 55.8%
- Resale value 25.0
- Past experience 22.1
- Handling 14.9
- Performance 12.0

Is this your first Corvette?
- Yes 46.9%
- No 53.1

Earlier Corvettes owned:

1977	17.5%	1973	28.1%
1976	24.6	1972	16.7
1975	31.6	1971	13.2
1974	28.1	1970	14.0
1969	10.5	1962	5.3
1968	16.7	1961	2.6
1967	8.8	1960	2.6
1966	8.8	1959	1.8
1965	8.8	1958	1.8
1964	7.0	1957	0.9
1963	6.1	1956	0.9

Specific likes:
- Style 76.8%
- Handling 66.7
- Performance 24.2
- Resale value 17.9
- Comfort 16.9

Specific dislikes:
- Paint/finish 31.6%
- Workmanship 19.9
- Quality of material 15.0
- Gas mileage 10.7

What changes would you like?
- Metal body 14.4%
- Quality of material 12.9
- Paint/finish 8.2
  (Throughout the survey were many comments on uneven finish, chips, bubbles, blisters)
- Better gas mileage 7.7

Workmanship opinion:
- Excellent 12.1%
- Good 29.0
- Average 21.5
- Fair 14.5
- Poor 22.9

Comments on fiberglass body:
- Good—no rust 25.5%
- Poor—paint/finish 21.9
- Poor—can see all seams .. 6.8
- Poor—body cracks 8.0

Comfort opinion:
- Excellent 31.8%
- Very good 38.3
- Good 19.2
- Fair 9.3
- Poor 1.4

Had any mechanical trouble?
- Yes 61.6%
- No 38.4

What type of trouble?
- Airconditioning 19.2%
- Electrical 16.2
- Speedometer Cable 13.1
- Carburetor 11.5
- Transmission 8.5

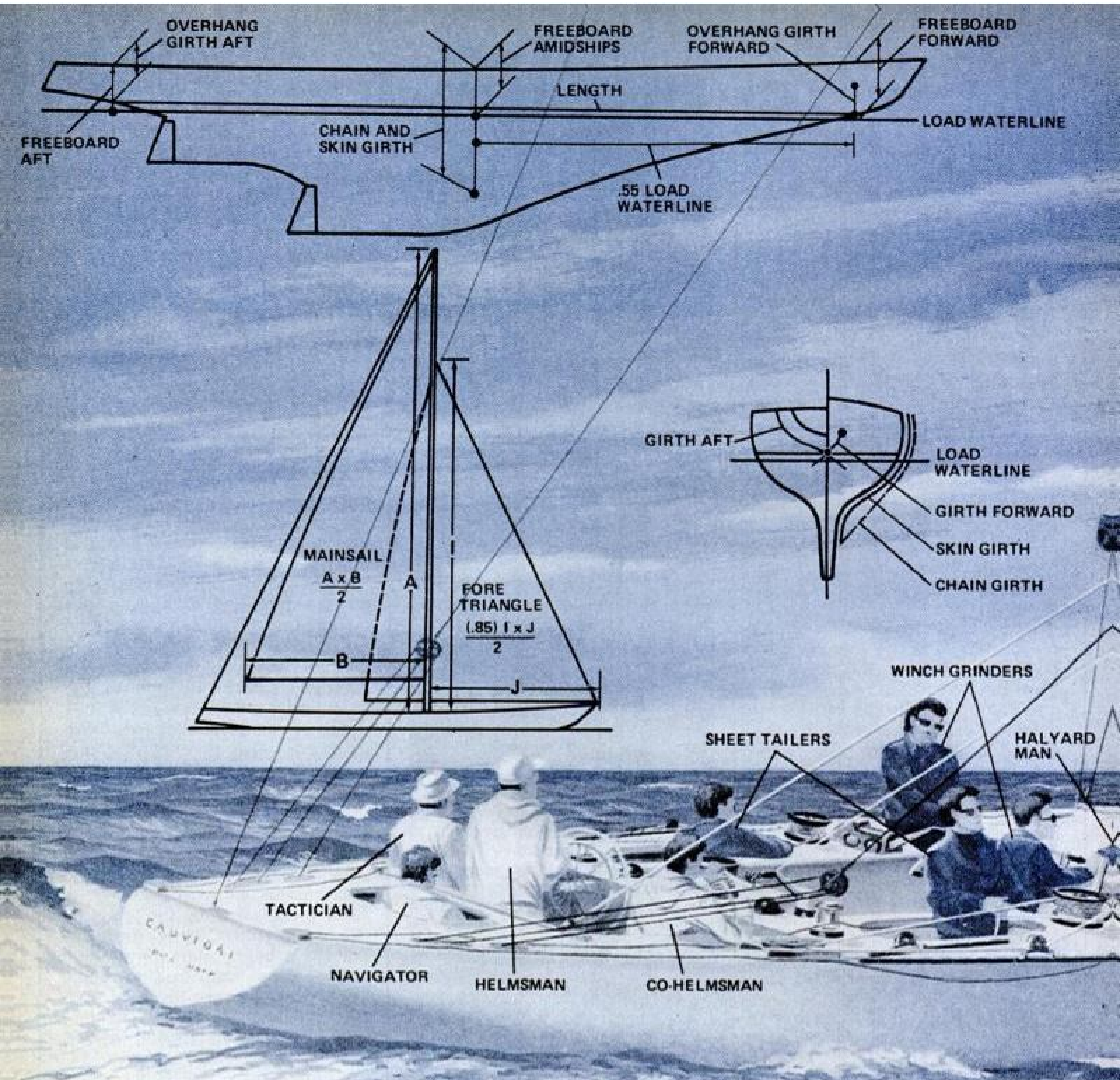
Dealer repairs satisfactory?
- Yes 57.8%
- No 42.2

Dealer service opinion:
- Excellent 20.5%
- Good 28.1
- Average 20.0
- Fair 12.9
- Poor 18.6

Age distribution of owners:
- 15-29 years 49.9%
- 30-49 years 43.0
- 50-plus 7.1

Would you buy another Corvette?
- Yes 75.7%
- No 24.3

*Percentages might not equal 100% due to rounding or insufficient data.



How big is 12 meters of boat?

America's Cup 12-meter yachts—the most refined of sailing designs—really have no measurement 12 meters long.

by Tom Bottomley

The magnificent 70-foot sailboats that will race this month off Newport, R.I., to challenge and defend the America's Cup are also the world's most challenging of yachts to create. These competitors for sport's oldest active trophy are all built to the same rules of measurement, but no two are exactly alike. Each boat has its own personality, characteristics

PM art: Allen Beechel

and appearance; each designer hopes his interpretation of the rules will contribute that little extra edge of winning speed and performance.

Sailboats in the well-known "One Design" classes have every last dimension spelled out, and all boats in a class are theoretically identical. But under the International Twelve Meter Class rating rule, a naval architect can exercise a great deal of leeway. The total of his calculations must equal exactly 12 meters, but the factors in his formula can vary as he designs his way toward that "perfect" solution.

The purpose of the rating formula is to allow continual improvement of hull form and yet still provide boats reasonably equal in potential so that sail design, crew seamanship, helmsmanship, navigation and tactics are brought into play. In the match-racing game, well-sailed slower boats have beaten faster ones that made mistakes.

The formula takes factors that help speed—long waterline length or a large sail plan—and balances these against those that slow a

(Please turn to page 168)

Have more CB fun with these add-ons

Pep up mobile and base radios with these instant accessories.

by Anthony R. Curtis
RADIO EDITOR

The bloom is off the rose. Your new CB radio is nicked and scratched from sliding in and out of the car. It's time to add new fun and pep up the old set with practical accessories.

Hear better with your receiver by adding a **preamplifier** between antenna and set. It will turn on when you listen, off when you transmit. It boosts incoming signals before they arrive at your radio.

A variable audio filter between radio and speaker will let you tune out annoying interference and some stations blocking a channel.

If your transceiver doesn't put out as you'd like, change to the larger **RG-8 coaxial cable** from RG-58 to feed your antenna.

Headphones and **external speakers** take sound away from the crowd to your own private corner where you can make the most of CB operation without bugging others.

Special cases help you carry your radio from car to house or office or motel, in beauty—or in secret. With CB sets a prime rip-off target, an unobtrusive briefcase silently holding your set might keep it available longer for your use.

Meters check electronics. There are half a dozen you can use to watchdog the performance of your transceiver without needing a special FCC technical license.

Field-strength meters measure signals in the air from nearby trans-

(Please turn to page 188)

Secret briefcase

Only you will know this plain-looking briefcase holds radio, microphone, power cable and antenna. You even can operate the radio inside the case. $25, by Motorola, Inc., 1301 East Algonquin Rd., Schaumburg, Ill. 60196.

CB satchel

Foam-cushioned fleece lining babies radio while you carry it unobtrusively in Escort Bag ($15) from Vinyl Bag Works, Box 421, Lincoln City, Ore. 97367. In saddle-brown vinyl. Soft handles make easy lugging in 7x11, 8x12 or 9x14-inch sizes. Mike pouch is included.

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Microphone holder

CB mikes get lost under car seats and out of reach on dashboards. Keep yours close with Handy Handler ($2) slipped over end of gearshift. From Raydon Enterprises, Box 44605, Indianapolis, Ind. 46224.

Field-strength meter

Measure signals in the air from your transmitter with HD-1426 by Heath Co., Benton Harbor, Mich. 49022. Handy meter ($11) has effective internal solid-state antenna; lets you know radio is putting out power.

Frequency counter

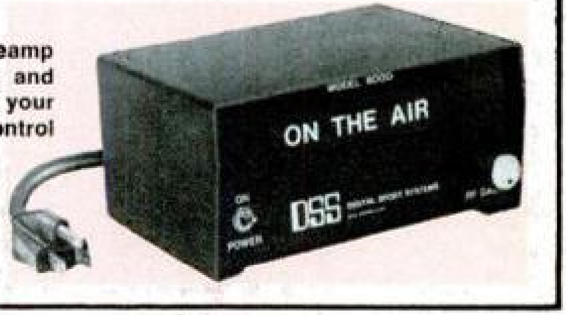
Set the B&K-Precision 1827 counter ($120) by your CB and watch it display in bright light-emitting diodes (LEDs) your exact frequency in kilohertz. By Dynascan Corp., 6460 West Cortland Ave., Chicago, Ill. 60635.

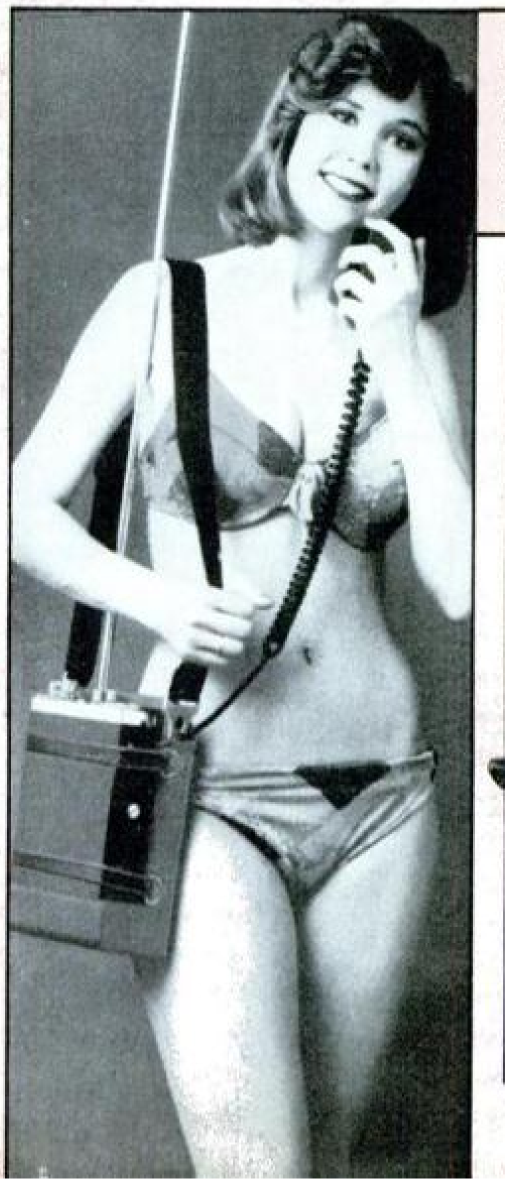
Mobile frequency display

Tiny counter for your car, in classy all-black ($125), plucks signals from the air, tells you are getting out, shows exact frequency in red LEDs. Hufco, Box 357, Provo, Utah 84601.

Receiver booster

Plug DSS-6000 base-station preamp ($59) into coax between antenna and radio. It will boost sensitivity of your CB receiver, and give RF-gain control to reduce sensitivity when neighbors bleed over. On-the-air sign lights up when you transmit. Digital Sport Systems, Box 377, West Liberty, Iowa 52776.





Battery pack

Take your car CB to the woods or beach with Power-Mate ($35) portable pack of nine "C" batteries weighing under a pound, built-in antenna and voltage meter. Kendon Manufacturing Co., Box 1977, Englewood, Colo. 80150.

Hands-free headset

Hear and be heard better with CB-1200 boom-mounted ceramic power-microphone ($59) with headphone for private listening. Telex, 9600 Aldrich Ave. South, Minneapolis, Minn. 55420.

Talk-power booster

Fancy base-station microphones are all the rage. Power-mic Model 18-002 ($60) by GC Electronics, 400 South Wyman, Rockford, Ill. 61101, has a lock switch to hold push-to-talk on for hands-free ratchet-jawing.

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"How did it happen?"

There's got to be an answer to how killer crashes begin—often seconds before the actual impact—so PM went out with a crack "Go team" to one such accident to find out just what caused it and how it could have been prevented.

by Mort Schultz

The smell and sight of the accident made me wish for a moment that I hadn't been heroic and told Bert Morrow, "Call me next time you get another." Morrow heads a team operating out of the University of Miami which investigates automotive accidents in South Florida for the National Highway Traffic Safety Administration.

The National Highway Traffic Safety Administration (NHTSA) is responsible for recommending ways of making cars, highways and driving safer. If a recommendation gets through Congress, it becomes law. Congress, for example, "legislated" collapsible steering columns and restraint systems.

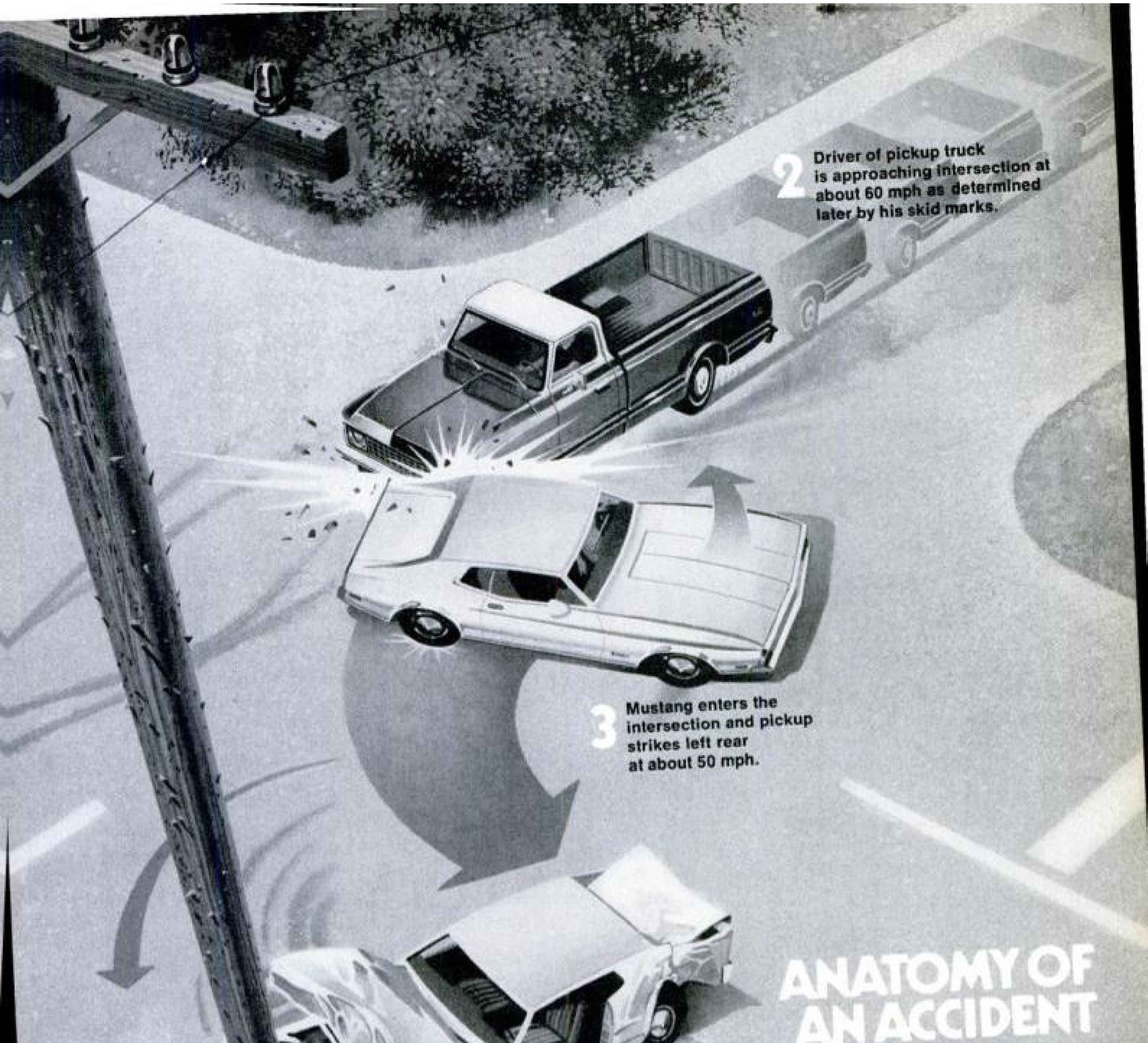
But it all starts in the field with on-site accident investigation by teams like the one in Miami. Presently, there are seven similar units scattered throughout the United States. I was about to find out how one worked.

Scene of the accident

The open-sewer odor emitted by swamp cabbage hung heavy in the humid air that afternoon when a 1972 Mustang and 1970 Chevrolet pickup truck collided on a rural two-lane road in Dade County.

The Mustang, its caved-in nose resting against a power pole, caught my eye first. It was only natural to look for a body or two, which I found.

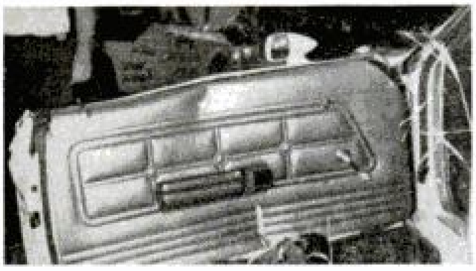
Two blanket-covered mounds—one large, one small—lying near the wrecked Ford made me speculate "victim and child." I was wrong. It



ANATOMY OF AN ACCIDENT

A young woman at the wheel of her Mustang halts at the stop sign (1), but because of the trees she cannot see very far up the road to her left. The driver of a pickup truck (2) cannot see her stopped at the sign. Instead of creeping forward, she accelerates quickly to cross the intersection. The pickup truck driver, going 60 mph in a 40-mph zone, slams on his brakes. In the intersection, the pickup hits the Mustang just behind the driver's-side door (3). So far, neither driver is hurt, but the Mustang spins counterclockwise, the driver's-side door flies open and the woman, not wearing a seat belt, is thrown to the pavement where her skull is fractured. She dies. The spinning Mustang drags her until it is stopped by a power pole (4). Her leg is sheared off in the impact. The pickup truck continues down the road making a half-loop and comes to rest (5).

Accident investigator, above, examines Mustang. Photo below shows deformation of Mustang door from impact of driver, who was not wearing a seat belt and was thrown from the car when door flew open.



was victim and her amputated leg.

I left the security of my Pontiac and walked over to a group of uniformed people, each armed with clipboard and pencil. Slight-of-build and bespectacled, Bert Morrow stood in their midst issuing orders like a Marine drill instructor. He bore little resemblance to the mild-mannered lecturer I had witnessed a few days earlier in a hall filled with students at the University.

Morrow, you see, is a professor of civil and mechanical engineering. Accident investigation is an adjunctive duty as it is for all members of NHTSA teams.

Individual occupations include highway construction, automotive engineering, highway safety management, traffic engineering, automobile mechanics, medicine, dentistry, law, psychology, sociology, medical-records analysis and physiology.

In other words, a team has available to it for any one accident any discipline it needs to accomplish its goal, which is to find out—

How did the accident happen?

Why did the accident happen?

How could the accident have been prevented?

How could deaths and injuries have been avoided?

Applying technical and professional skills to automotive accident investigation allows the team to piece together an accurate, almost second-by-second account of an incident—something that cursory police investigation cannot do. Police have neither the time, money, manpower nor expertise to handle an accident the way a NHTSA team can do it.

NHTSA team members fulfill the same function automotively as do members of the National Transportation Safety Board's "Go" team. NTSB "Go" teams investigate commercial airline crashes.

According to Brad Dunbar of NTSB, their purpose is to "find out what happened and why." The job is done by gathering data and attempting to reconstruct the accident, using as a primary source of data the inflight recorder that gives a minute-by-minute account of the events taking place in the cockpit to the time of a crash.

NHTSA "Go" teams have no such aid when investigating auto accidents. They literally have to sift dirt and wreckage to reconstruct events. They are skilled interviewers, able to cut through lies given by involved parties and misinterpretations of what occurred by witnesses.

"Dick, you and Len gather physical evidence," Morrow was saying as I reached the group. "Find out how far forward you have to come before you can see around those palms."

Gathering the data

Morrow was referring to the row of royal and coconut palm trees lining the two-lane road. It became evident as the team reconstructed the chain of events leading to the accident that the Mustang had come to the intersection and had stopped at the stop sign. However, the driver from her position could not see the Chevrolet truck coming from her left. The palms blocked her view.

Instead of crawling forward, she had accelerated rapidly and attempted to drive across the road. Tire marks on pavement at the stop sign attested to the acceleration.

"Harry," Morrow instructed, "you talk to the driver of the truck and get his story. Then you and Dave check the mechanical condition of the Ford and pickup."

Harry was to learn that the truck driver had been traveling 60 mph in a 40-mph zone. (Denied by the driver, but confirmed by the length of the 70-foot long skid marks made by the truck's front tires.)

Harry and Dave also established that both Mustang and Chevy were in sound mechanical condition. This came as no surprise. According to Jim Fell of the NHTSA, faulty mechanical condition contributes to only 4 percent of all accidents. Eleven percent result from highway and weather conditions. This leaves a disproportionate 85 percent caused by human failure.

"Carol," Morrow said to the last member of his team, "talk to the ME after he does the autopsy. And check out the medical and accident records of both parties."

Medical and accident records revealed that neither party drank excessively or took drugs. The driver of the truck had been cited once for a passing violation. The dead woman had had a previous accident.

The medical examiner's report was extensive. The totally battered body had suffered a skull fracture, which was the cause of death. The leg was amputated after death.

Like most detective work, piecing together a clear picture of a vehicle accident is not a glamorous job. It is laborious and time-consuming. Dedication to details and abiding patience are required.

It took almost two months for data to be gathered and processed. It took another month for team members to pore over evidence and cross-check each other's findings. It took two more months for the 40-page "Multidisciplinary Accident Investigation" report to be written, printed and sent to Washington.

The official report

From such evidence as skid marks, tire dust, swirls in highway dirt, a dent on the inside of a door panel and a crushed body can a series of events as the following be reconstructed:

The woman driving the Mustang approaches the intersection and comes to a stop at the stop sign. Her view to the left is blocked by a row of palm trees. She can see only 30 feet up the road, so she can't see the Chevy truck approaching at a rapid speed. Neither can the driver of the truck see her.

She chances it anyway and accelerates into the intersection.

The woman and man spot each other almost at the same time. Her car's speed has hit only 13 mph. She vainly floors the gas pedal. He vainly slams on his brakes.

The truck decelerates from 60 to 50 mph before impact. It hits the Mustang on the left rear fender.

Ironically, little initial damage is done to the Ford and the woman is not injured. However, the force of the impact causes the Mustang to be spun around counterclockwise at a speed of 18 mph. The impact "stretches" the car's metal, causing the door latch assembly to fail as the unrestrained woman hits against the door. An imprint of her shoulder is left on the door panel.

The door flies open and the woman's torso is thrown from the car. Her head hits the pavement. Her skull is fractured. She dies.

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FIRSTHAND REPORT

by Bill Hartford
AUTO EDITOR

Driving the Mercedes-Benz 6.9

A dream on the road—a nightmare in the garage.

On the outside there's little to indicate that this new $38,000 Mercedes-Benz is not "just another" 450 SEL—a 6.9 emblem, wider wheels and tires and some wood on the dash are all. Only an X-ray look reveals the car's incredible nervous system: It's suspended on nitrogen gas and oil; no springs or shocks are used. The 6.9-liter (417-cu.-in.), o.h.c. V8 is a dry-sump design, the 12.7-quart oil capacity being contained in a separate oil reservoir as shown below.

The 6.9 is an extraordinary car . . . and a Frankenstein monster. Driving it is guaranteed to give you an acute case of shade-tree schizophrenia—that ambivalence you feel when you admire a technically sophisticated machine, and wish it were yours, yet know that it would be a nightmare to maintain yourself!

Those who buy this $38,000 car are immune to this malady, of course, because they'll pay a highly skilled brain surgeon of a technician at the Mercedes dealership to take care of it. But we how-to types are tough on ourselves—we insist on knowing our machines inside and out, so, single-handedly, we can keep them in good health. Well, do-it-yourselfers, look on the 6.9 and despair; it may be beyond your ken!

Archimedes himself would have had trouble coping with the nitrogen gas under 2000 p.s.i. of pressure in the suspension system. You can remove, replace, even drop a leaf spring, torsion bar or coil spring on your toe, but how do you handle a charge of nitrogen gas that could very well blow off your head? The gas serves as the springs of the car. The gas-filled struts are progressive springs: The more the gas is compressed, the harder it is to compress further, so the suspension hardness changes in proportion to the load.

The gas charge at each wheel is of a fixed amount with a pressure reservoir connected to each strut. So much for the neat pneumatics—now to the hydraulic part of the hydropneumatic suspension system. The oil in the system holds up the car: It's under pressure generated by the hydraulic pump on the engine. Regulator valves adjust oil volume at the wheels to compensate for vehicle load, so ride height and leveling are automatic.

Q.: What keeps the car from plopping down in the driveway when you shut off the engine?

A.: Check valves. They maintain the pressure in the system.

Since you're floating down the road on nitrogen with this setup, Mercedes uses stiff front and rear stabilizer bars, and also goes a step farther and

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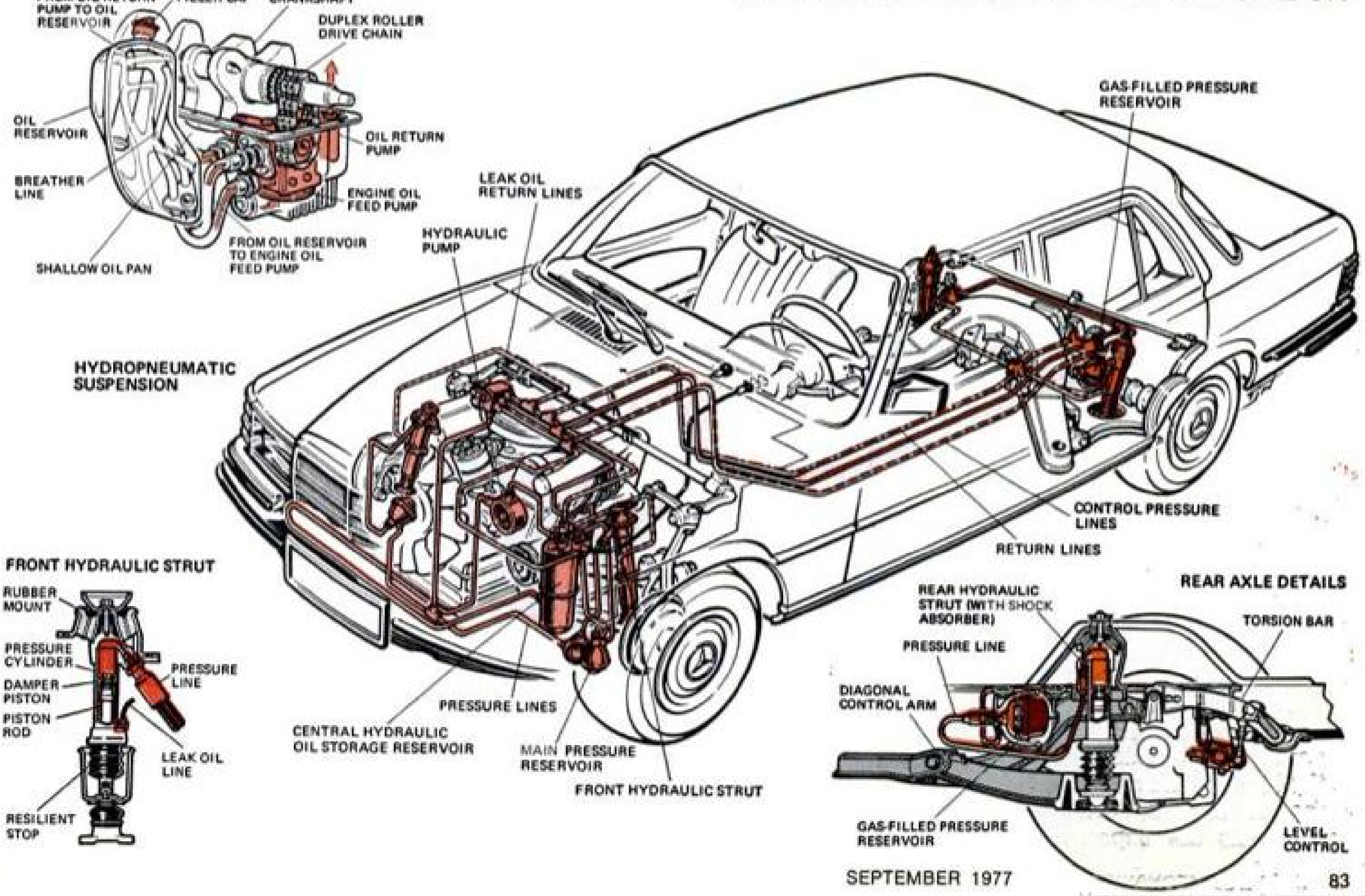
UNDER THE SKIN OF THE 450 SEL 6.9



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One Step vs. The Handle: Under-$40 instant cameras

Prices plummet on new Kodak and Polaroid quick shooters.

by Gerald R. Patton

Now you don't have to wait days to see if your prize-winning photo turned out. And you don't have to lug a bag of money down to the store to buy an instant-picture camera. Kodak and Polaroid are out with under-$40 instant-picture cameras which take great point-and-shoot photos.

The other day, I spotted a nice picture possibility as my wife played at poolside with our dog, Snoopy. I lifted the camera to my eye, held it steady with its giant built-in handle, and pressed the exposure button. I unfolded its crank and turned it smartly four times, causing the print to emerge from the top of the camera. In eight minutes, the litter-free print developed into a full-color beauty. My subject was ready for the family album, easily and quickly, with a camera called The Handle by Kodak.

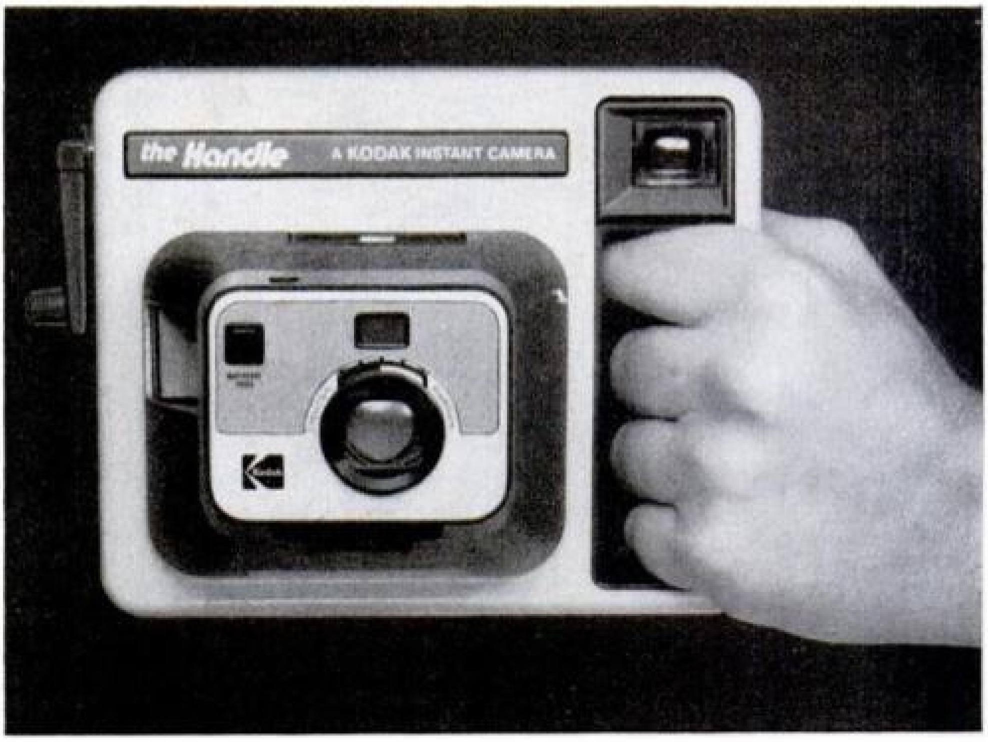
The Handle

Simplicity is the real beauty of The Handle, and its counterpart, the Polaroid One Step. No settings need to be adjusted because the lens in the camera is fixed-focus. Under normal daylight conditions, anything from 4 feet to infinity in front of the lens will be in focus. When using a flash, a photosensor automatically varies the shutter speed to permit sharp pictures in the 4- to 8-foot range.

The Handle is molded of high-impact plastic with metal trim. It uses a two-element, 100-mm, f/12.7 coated plastic duplet lens, which provides a slightly wider field of view than the Kodak EK4 and EK6 instant cameras. A lighten/darken control manually sets the exposure system

Polaroid's One Step (above) features a motor-driven picture-ejection system, variable aperture and shutter speed, and automatic time exposures to one second.

Grab The Handle by Kodak (below). It has a silicon-cell exposure control that sets the proper shutter speed. An eight-bulb Flip-Flash is used for night operation.



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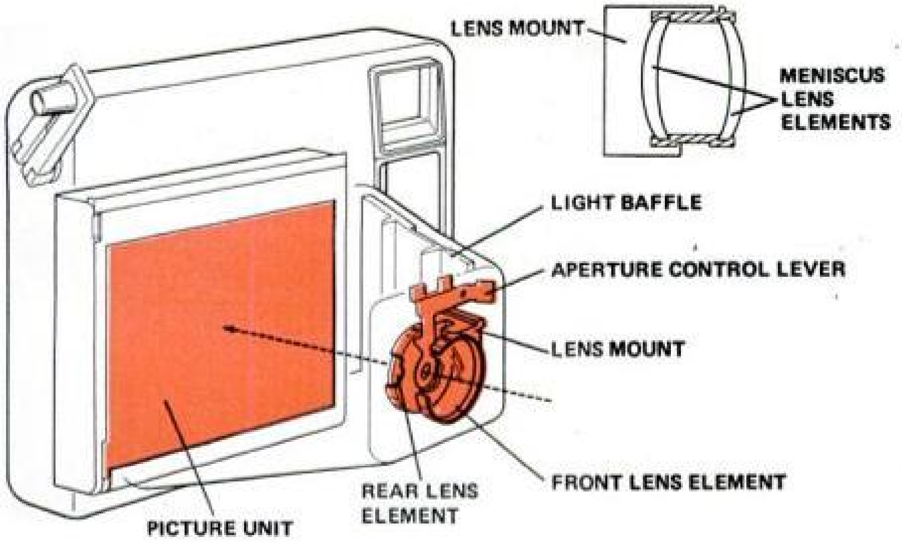
THE HANDLE EXPOSURE PATH AND LENS

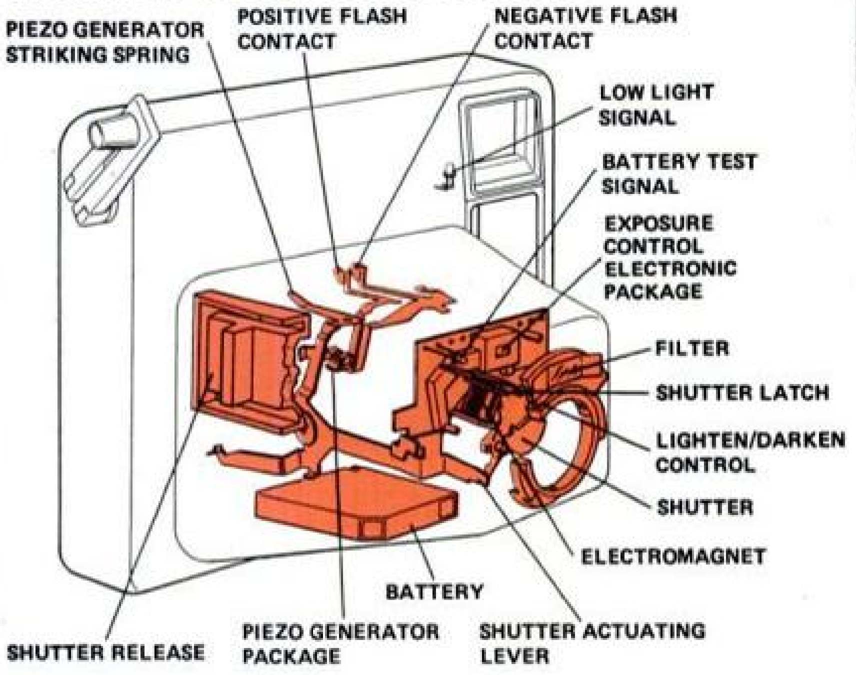


to plus or minus one f/stop, and there is also a mechanical exposure counter.

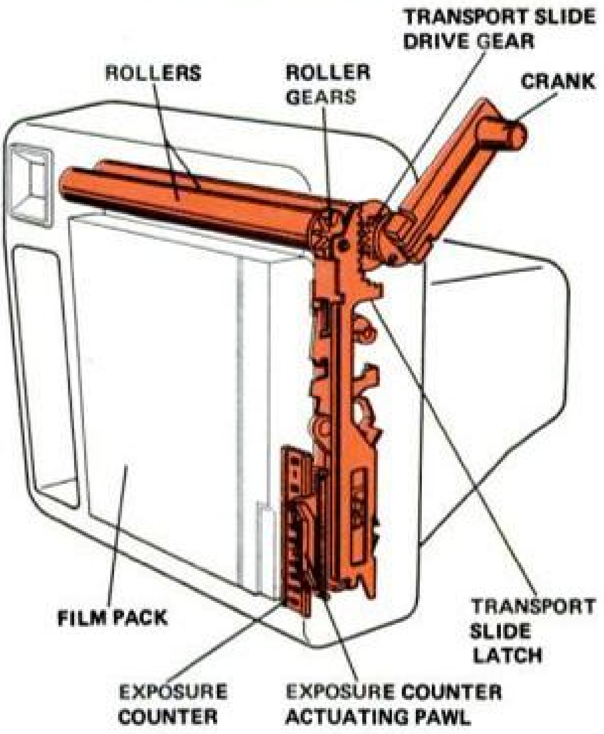
One Step

Frankly, I liked the One Step better than The Handle. The Polaroid has motor-driven picture ejection. By pressing just one button, the One Step delivers a developing color picture in less than two seconds. It lets you vary aperture and shutter speed and make automatic time exposures up to one second. One Step has automatic dark-slide ejection and fill-flash capability. ★★★

THE HANDLE EXPOSURE CONTROL PACKAGE



THE HANDLE TRANSPORT MECHANISM



Inside The Handle: Exposure and transport systems are linked to prevent double exposures and wasted flashes.

Coming soon: Kodak's super instant

Kodak's new top-of-the-line folding instant-picture camera, the EK8, now on sale in Europe, will be coming to America soon.

EK8 features a coupled range-finder and a three-element 137-mm, f/11 coated plastic lens which focuses from 3½ feet to infinity. Produced by Kodak A.G. at Stuttgart, West Germany, the camera uses a high-speed motor to eject the exposed picture from the top of the camera.

Automatic exposure timing results from a silicon photosensor operating in conjunction with an electronic shutter capable of speeds from 1/300 to 1/20 second. Flash range is 3½ to 10 feet. The camera even lets you know when flash is needed. No word yet on its price in the United States.

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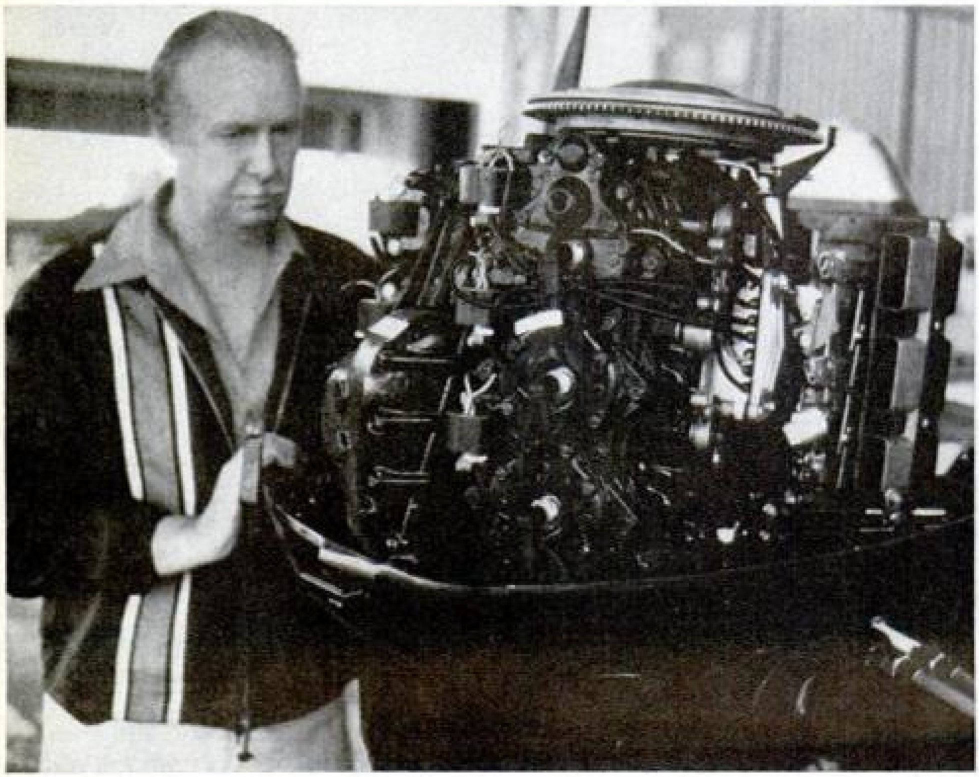

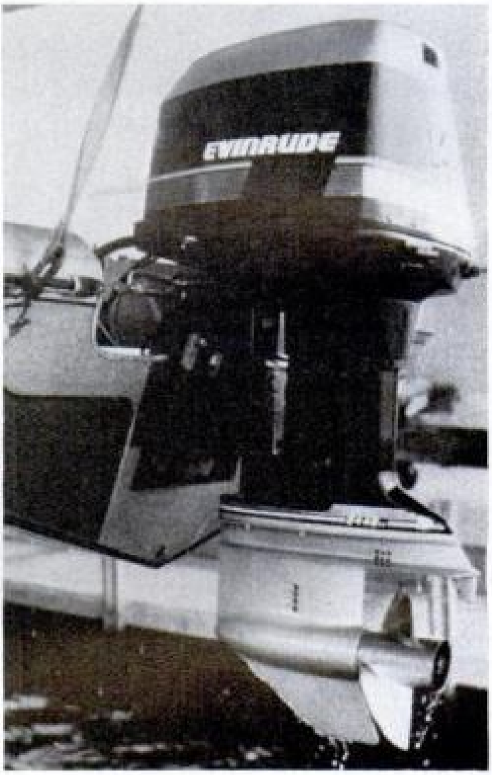

Wave of future? PM testers Evinrude and McKeown (top) try out boating's hottest new outboard at full bore. At same size and displacement as this year's 200, new mill hides its muscles (above) under sleek cowling (upper right) with noticeable blank where eventual certified horsepower rating will be placed. Major powerhead secret is enlarged bulge at rear of engine between cylinders of 90° V6, 149.4-cu.-in. motor. Intake and exhaust ports have been raised and exhaust manifold modified so each cylinder has full-length passage to tuned megaphone. Dual carburetors for each pair of cylinders plus dual fuel pumps and power pack for each bank of three cylinders featuring new faster rise-time ignition coils all contribute to boost in horsepower and improved fuel economy. In spite of high-speed capabilities, engine can throttle down to smooth idling speeds (right) and appeared as quiet at all settings as smaller motors.

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PM tests the outboard too hot to name

Our skipper and motor carried the Evinrude label—but the horsepower rating was blank.

by Bill McKeown Boating Editor

The rumors are true! For months there have been hints that the boys in the engineering backrooms of the biggest outboard companies have been grooming entries for another horsepower race next year.

The industry doesn't like to call it a contest, but a lot of big-boat owners like to buy the biggest outboard available, and there seems to be a sizable market for the multi-muscle mills. This year the leaders have been Evinrude and Johnson at 200 hp. and Mercury's Black Max with 175. Now the word is out that boatmen may be ready for even more.

We wanted to ride the new winner for a PM performance test, and as of now it looks like the engine will say "Evinrude" on the side. For checking out the prototype, we were fortunate again to get the industry's dean of test drivers, Ralph Evinrude. Ever since he was old enough to handle a boat powered by his father Ole's invention, the first commercially successful outboard motor, Ralph has been performance-testing.

More than enough power

But this newest powerhouse wasn't ready for production when we told OMC engineering expert turned OMC president, Charles Strang, that we wanted 6,000,000 PM readers to be the first to know about his new line-leader. "And how much horsepower will it have?" we added casually. Charles gave the grin which meant "more than enough to beat anything the competition can cook up between now and 1978!" What he actually said was, "We won't be announcing horsepower rating until it's certified by OBC later in the year. If you want to test a prototype, however, we'll try to arrange it." Apparently the mill had such potential that they could wait until the last minute to name it.

We agreed to slip into one of OMC's Florida test bases and give a development model a wringing-out before we knew its rating, and we were particularly glad to have Ralph Evinrude along. He might share the blame if PM's team of Evinrude and McKeown pushed the setup a little too hard and this very expensive jewel box blew apart or didn't show all the hinted hp.

All kinds of tests

First came an installation preview as our sleek 19-foot CheckMate runabout was lowered into the water. Then a careful run out and up a back bay away from prying eyes where we could check out trolling and cruising. And finally, full-bore runs and high-speed maneuvering. For a chase boat we had a prototype Molinari open-tunnel hull, first in the United States.

Out running, our mystery engine could easily pass for the 175 and 200-hp current models that use the same block and 149.4-cu.-in. displacement. At cruise, it would take a db meter to note any difference in the quiet mutter of the new motor, and fuel consumption, I was told, was being held down by a new carburetion system for all three V6s with "pull-over" metering.

But the real action from this engine comes when the throttle is pushed. Punch the single lever that now controls speed, trim, tilt and shift, and you jump ahead with unmistakable acceleration. This power gets water skiers up and skimming, or pushes a big hull promptly up on plane—strong selling points.

Equally important was the way we could run away from the chase boat with its two 140s. There's no longer the need for the expense, weight and fuel of many twin installations. Yet again, there seemed to be no more noise than with smaller motors and talking aboard was not difficult. The

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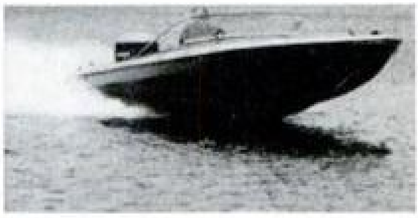
PM photos: Jim Jost

At idle and in reverse: New engine is quiet; suspension produces little vibration. Shift is positive, rpm advance smooth with no roughness.



Accelerating onto plane: Low-speed torque lifts big hull quickly and it should have no trouble pulling out water skiers for deep-water start.

At full bore: Checkmate runabout steps out at an impressive 60 mph. A deep lower unit, in 20 and 25-inch lengths, gives positive control.

With prop tilted, shallow-water idling is possible; trim controls are part of throttle-shift lever; power tilt makes weed cleaning and beaching easy.

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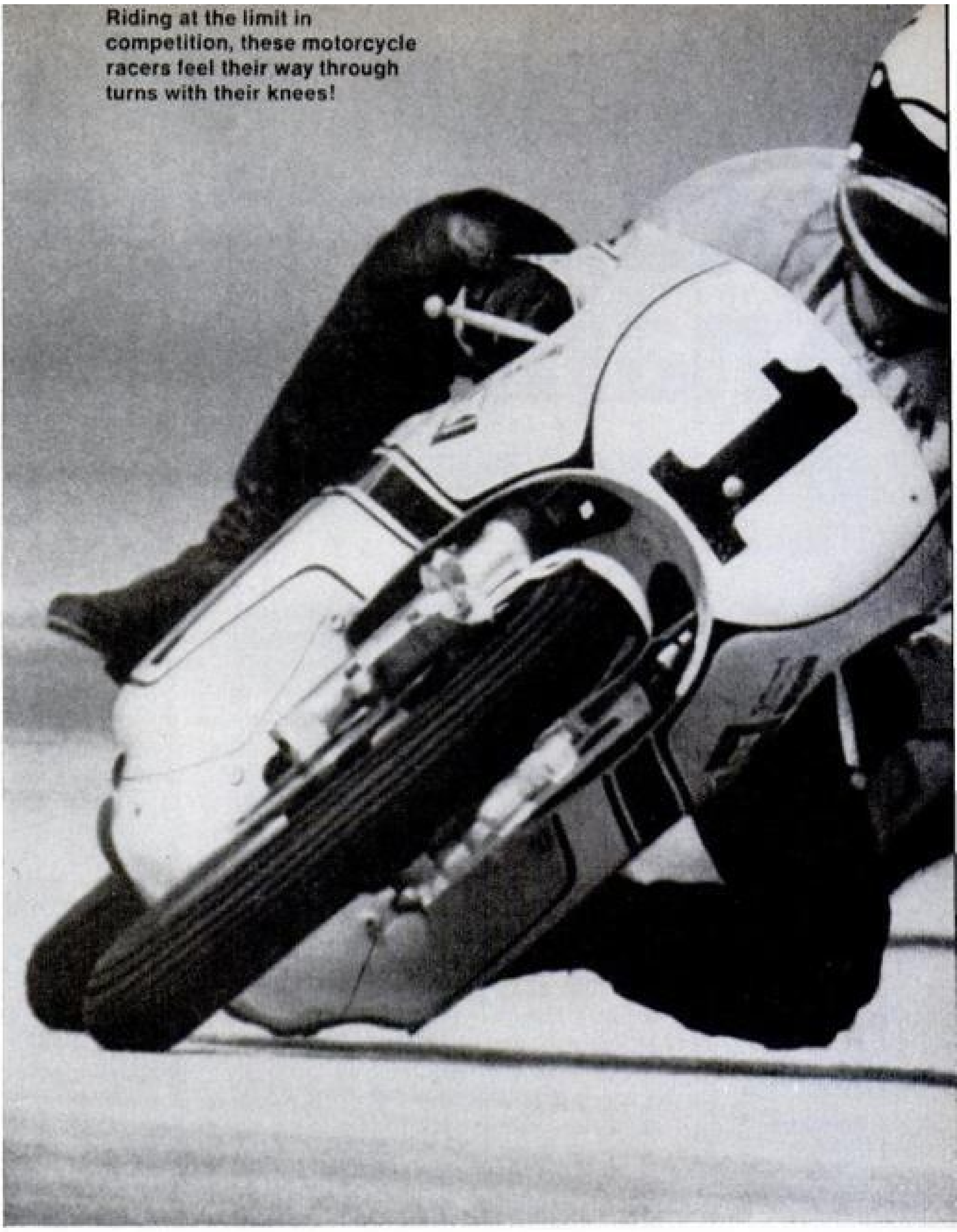
How to corner like a pro

by Bill Hampton



Riding at the limit in competition, these motorcycle racers feel their way through turns with their knees!

Cornering a motorcycle is fun—and challenging. You experience a new dimension of movement, much like a pilot banking his plane for a turn. Unlike a pilot, however, your safety depends on two small patches of rubber. If they kiss the road good-by, you're in trouble. It's not hard to get into trouble with a motorcycle when the road changes direction.

For instance, let's say you're riding down a long stretch of highway. Maybe you're tired, or just daydreaming. Anyway you've let the speedometer needle creep around the dial farther than you should have.

Your senses "lag" behind the speed at which you're traveling.

Then . . . a curve in the road suddenly sneaks up on you! Desperately you apply the brakes to scrub off speed. Too late!

You enter the curve at a high rate of speed. Centrifugal force takes over and pulls you off the road. Or, in an effort to resist the centrifugal force, you bank the bike too sharply and skid out.

You can't fool laws of physics: Take a turn too fast, and centrifugal force will snatch you out of the saddle one way or another.

Balancing forces

Do you know how far you can lay your bike over in a turn? Or how fast you can sweep around a curve with it?

Have you ever wondered what's involved in making that steed change direction?

A slight shift in body weight and the motorcycle heeds your command to assume a new course. When you shift your weight off center, you lean the bike to set up for the turn. Something called precession gets into the act, too.

If you've ever played with a toy top or gyroscope, you've seen precession at work. When a spinning body is disturbed, it turns, or precesses in toward the lean side to counteract the disturbing force. So the angle of lean and the turning of the front wheel set you off in a curved path. Instead of shifting body weight, you can get the same effect by pushing down on one end of the handlebar.

A motorcycle with good steering geometry will uncannily select the right combination of bank angle and radius of turn to match its speed around a turn. It's as though the machine knows how it wants to get around the curve without any help.

You can even set up for a turn by twisting the handlebar to one side when traveling straight ahead. The bike will lean instantly and turn to the opposite side the handlebar is turned. Be careful, though: Yank on that bar too hard, and you could set yourself up for a bad spill.

Tires in turns

Tires play an important role in cornering, too. To maintain traction, they distort at their contact patches to produce a phenomenon known as "slip angle." When the tires are banked, the ground imposes a side load on them. This causes the tires to "creep" off to the outside of the turn.

Slip angle is the difference between the direction in which the tires are pointing and the direction they're actually traveling. Slip angle makes a motorcycle understeer. In a sense, it's a safety factor. It keeps the bike from oversteering or cutting in too sharply during hard cornering. For road riding, a ribbed tire on the front and a universal pattern

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on the back make a good combination. And keep those skins inflated properly.

Soft tires mush through the turns; hard tires cause skids. Moreover, the suspension units shouldn't be worn or loose in any manner. Keep the chain properly tensioned and well lubed. Power delivery must be smooth and sure at all times.

Ground clearance

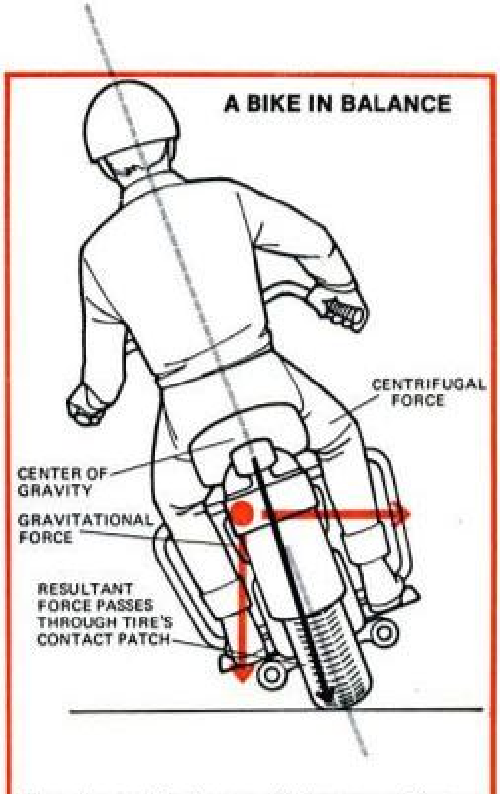
Does your bike have adequate ground clearance? Any part of the motorcycle that protrudes far enough to snag during cornering should be either removed or modified. On some bikes the center stand, side stand, or muffler(s) may ground at even moderate bank angles. About the only effective way to modify a low-hanging center stand is to remove it.

As for the side stand, it may be bent out of the way or part of it ground or sawed off to provide more ground clearance. Reposition low-hanging mufflers.

Additional ground clearance can be had by setting up rear shocks to hard setting. This method jacks the rear end of the bike up some, but it might affect the steering geometry of the front end. Also the bike may hop around on bumpy curves. A bigger wheel or tire up front can provide some additional clearance. But it, too, can affect steering geometry. And don't forget that when carrying a passenger, your bike may sit lower to the ground.

When to brake

So much for your bike. Now let's see how to take those curves. First, get your speed down *before* you enter a curve. Scrub off excess speed by downshifting and by applying brakes simultaneously. On four-stroke engines, just down-shifting alone will slow a bike for shallow curves. A two-stroker is something else: It has little engine compression to hold a bike back. So the brakes have to be worked harder.



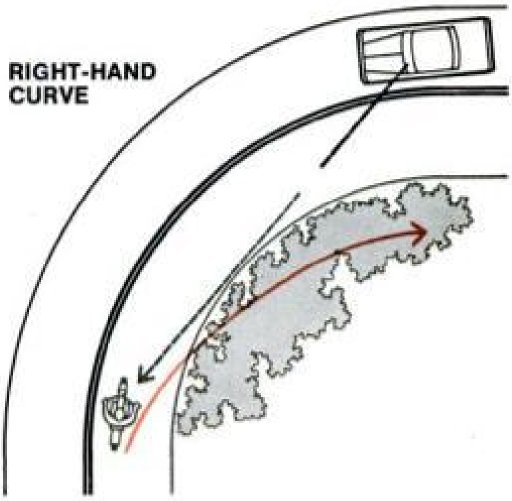
Even in gentle turns, all forces acting on you and your machine must be in balance.

Keeping the brakes on as you lay the bike over only increases your chances of skidding. Furthermore the front end becomes loaded and affects the bike's tracking through the curve. If you must brake in a turn, use the rear brake—tenderly.

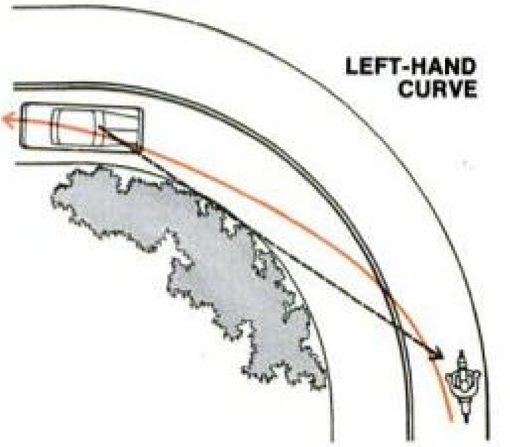
There's more to cornering, however, than just keeping the bike's speed within reason. Scan the curve as far ahead as possible. Learn to recognize slippery or unstable surface conditions so you'll have time to alter your speed and position.

On bumpy surfaces keep the speed *below* what you'd normally corner at on smooth surfaces. Keep in mind that on a banked motorcycle the suspension can't absorb impact forces as well as when the motorcycle is upright. Therefore, the tires are more prone to "bouncing" free of the road.

When you enter a curve, be in a gear that's low enough to let you keep some throttle on as you negotiate the curve. Keeping the bike under power helps to stabilize it. Hold the throttle steadily. Playing with it only unstabilizes the bike and upsets that delicate bond between the rubber and the road. For the same reason don't shift gears when banked. Accelerate smoothly as you exit the curve. Then shift into a higher gear as the bike straightens up.



In a right-hander, enter from near center of road and gradually drift over to right. Remember, you want to see and be seen.



In a left-hander, enter from right side of your lane. Keep the arc as flat as possible to minimize the centrifugal force.

The "path" that you follow around a curve is important, too. Flatten the curve as much as possible to minimize the pull of centrifugal force. But that's only part of picking a *path*. You also want to see around

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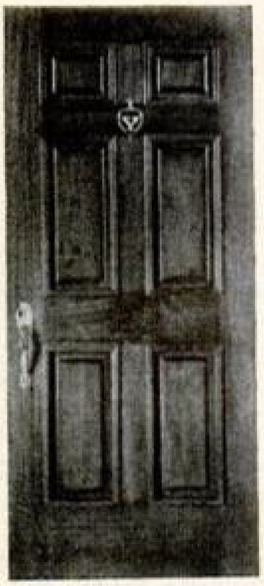
9 new products for

The seductive whirlpool bath

The height of good sensation in bathing may well be reached in this fiberglass whirlpool bathing oval by Kohler. The king-size 5½ x 7-ft. oval has six adjustable whirlpool jet heads that rotate 60° for effective massaging action. A timer enables you to keep track of your whirlpool time. Baths start at $1933 and jets start at $67 from Kohler Co., Kohler, Wis. 53044.

Pad for painting

The manufacturers of this 9-in. Pad Painter say that it covers more area per paint dip than brushes or rollers; the absorbent pad prevents dripping of all types of paint. It's $5.49 from Tip Top Brush Co., Dept. PM, 151 West Side Ave., Jersey City, N.J. 07305.



Welcome

Save by buying handsome but unfinished mahogany doors. Four styles from $170. Emperor Clock Co., Fairhope, Ala. 36532.

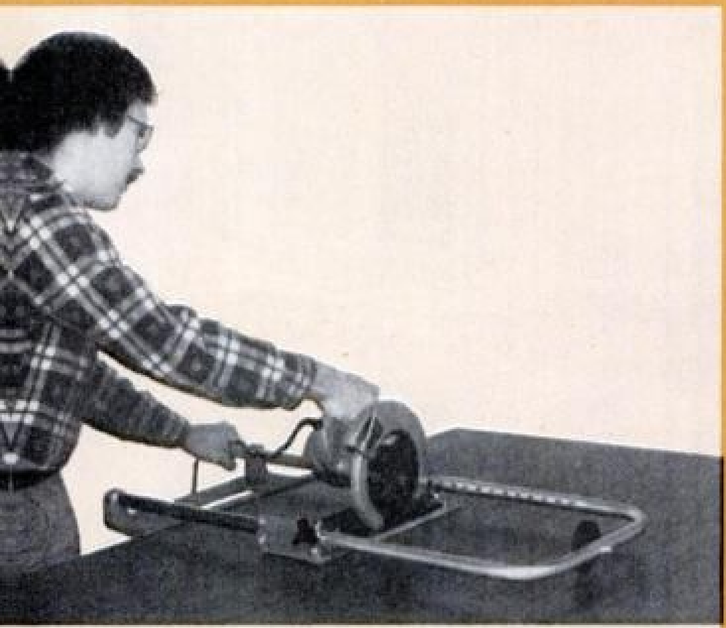
Smooth cover

Cover your plaster or other rough walls with Imperial Wall Cover before you apply wallpaper. One roll is $8.95. Imperial, 3645 Warrensville Center Rd., Cleveland, Ohio, 44122.

Elegant styling

Swag pendants and a bath cabinet decorated in a blue and white Sonnet style add glamor to a bathroom. Lights, $40 a pair; cabinet, $66, are by Thomas Industries, Louisville, Ky.

home improvement



Cut panels easily

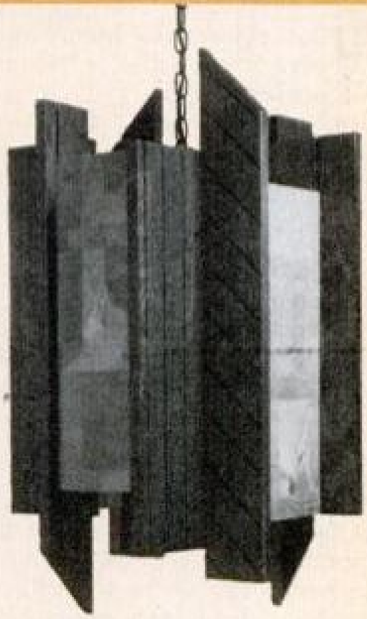
Cut large panels easily and accurately with the Panel-Crafter saw guide. It attaches to your circular or sabre saw and allows center ripping of up to 4-ft. panels. There is a built-in measuring scale so that you don't have to premeasure. From Minnesota Versatil, 5100 Edina Industrial Blvd., Edina, Minn. 55435. The Panel-Crafter is $49.95.

Dress up your bathroom

Traditional Elegance bath products are: three-way viewing cabinet from $148; vanity from $111, plus a marble top, and a linen cabinet, $74. General Bathroom Products, 2210 Touhy Ave., Elk Grove Village, Ill. 60007.

Burglar alarm in a box

Surprisingly, this tailored hardwood cabinet (8½ x 13½ x 4¾-in. high) contains a burglar alarm. The alarm has a sonic filter to detect hostile entry sounds which trigger a loud siren. The alarm shuts off automatically. Solid-state circuitry in the alarm helps insure fail-safe performance. The price is $249 and it includes a three-year warranty. From Sentron Manufacturing, Box 312, Barrington, Ill. 60010.



Natural light

Catch the warm glow from this ponderosa pine light with rough-hewn wood trim. The natural materials fit in a casual setting. Slimmer and broader designs are available. It's $146 from Thomas Industries, Louisville, Ky. 40202.

HOUSEPAINTING WITH A REGIONAL FLAVOR

Different parts of the country have distinct color preferences and special painting problems. Here's how to handle the total job where you live.

by Harry Wicks
HOME AND SHOP EDITOR

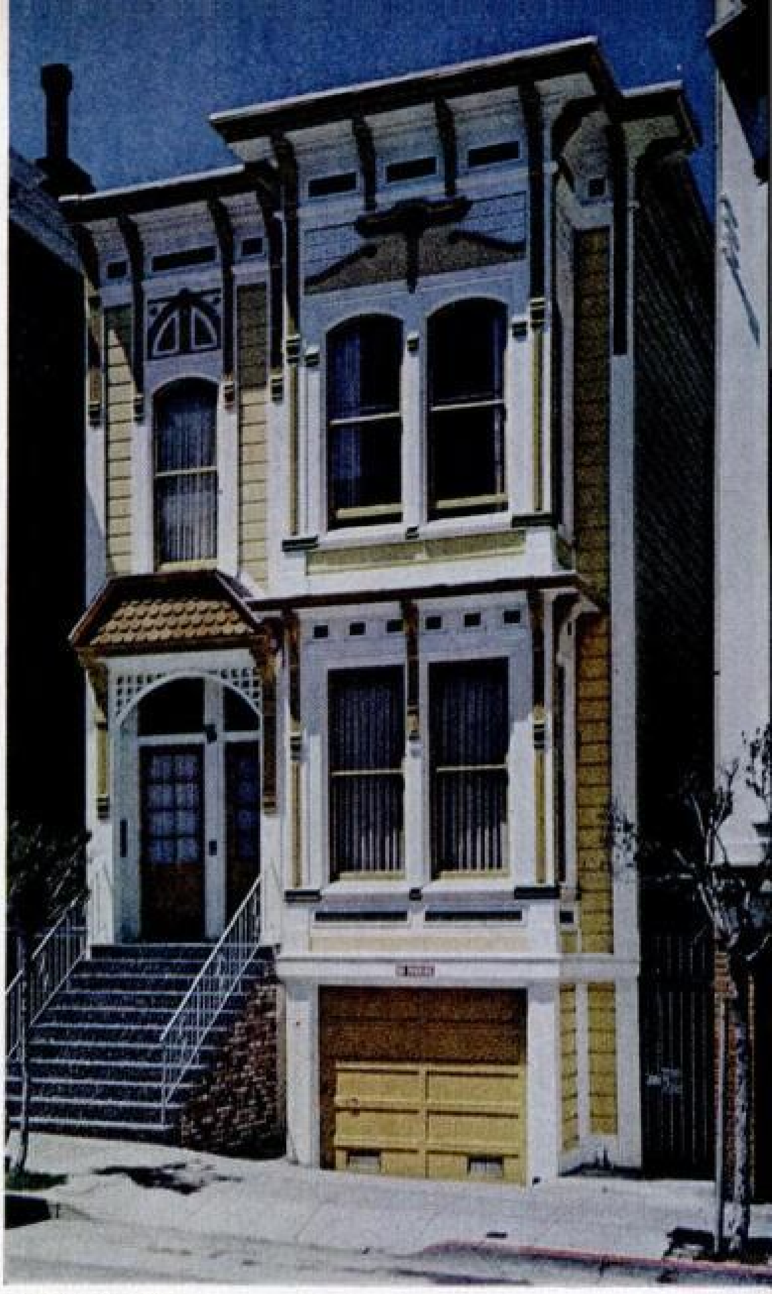
What colors are homeowners using these days to give beauty and individuality to their homes? Do color preferences vary from one geographic area of the country to the next? Or do homeowners—no matter where they live—tend to choose the same colors? And what about paint problems? Isn't it logical to assume that a home baking in the sun of the Southwest, for example, suffers ailments unlike those endured by a northeastern house subjected to cold weather and, often, sea spray?

We tossed these questions at Bonnie Bender, design and color consultant for PPG Industries, Inc., recently. She supplied some interesting answers, mostly from data accumulated in a round-the-country tour spot-checking houses.

"Initially," she said, "the tour was made to confirm previous studies on house color preferences."

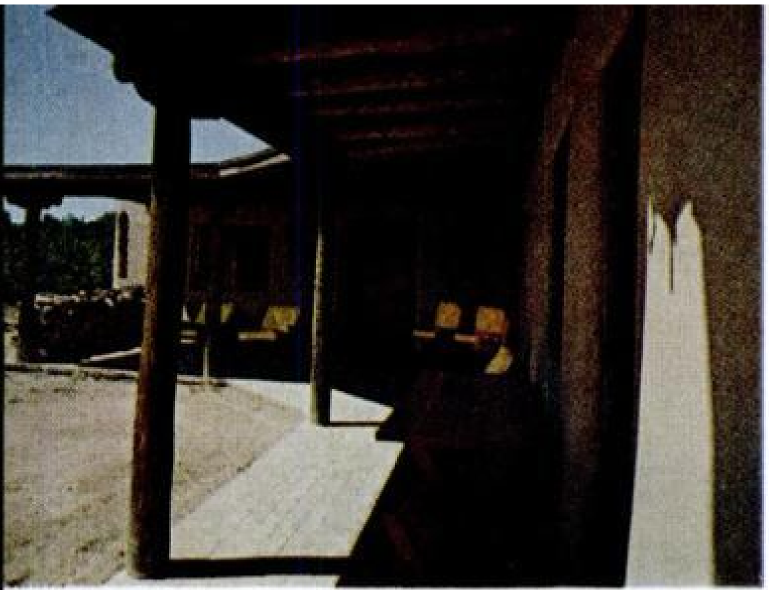
The general trend—across the country—is to the use of a quiet palette of exterior colors by homeowners who are repainting or remodeling their homes. The palette includes rich historic colors—grayed blues, olive-to-deep greens, mustard yellows, charcoal and weathered grays. This range of colors applies to repaint work on both wood and masonry homes.

The color lines that have, in a real sense, divided the country into specific architectural types show signs of dissolving. This shouldn't mean that cities and towns steeped in history will lose their original flavor and inherent charm. In fact, the past Bicentennial has



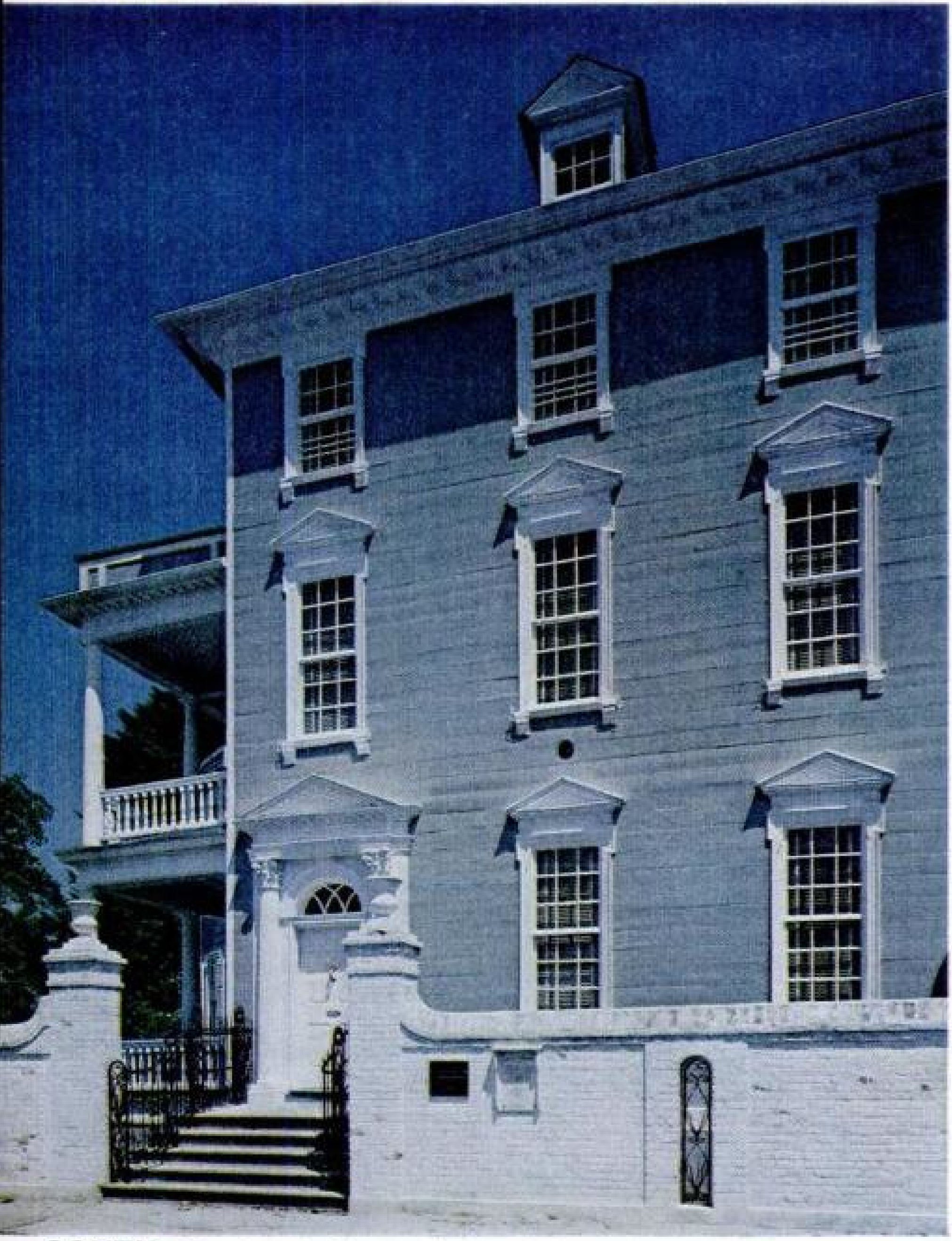
FAR WEST Colorful Victorian house in San Francisco typifies the originality and individuality of city dwellers. Owner chose bright colors to give the house a jewel-like appearance. In the country, West Coasters opt for muted earth tones.

NEW ENGLAND Most houses in New England remain white, but the latest survey shows muted colors moving inland. Many homes display the colors that echo back in history. Such historic colors now are available in both latex and oil-type paints.



SOUTHWEST Here, color it white and add adobe tones to those that relate to surrounding terrain and blend with the landscape. Desert earth tones persist because they have functional purpose too—they resist dirt and have good color retention.

MIDWEST White and traditional rural colors remain popular in farm belt with expanded use of earthy browns and reds. Gingerbread farmhouse above is painted in a rich color called Rural Red while trim details are finished with white.



SOUTH Pastels and whites continue to dominate. A major paint contractor in Old Charleston (where this house is located) claims that "colors are slow and easy, just as life in the city is—and we want to maintain that gracious character."

PAINT PROBLEMS—REGIONAL AND NATIONAL

Some paint problems are strictly regional but most of them occur all over the country. For example, in the North and Northeast, sleet, snow and gale-force winds are normal conditions. Ice and dust storms often plague the Midwest. Strong sunlight (with its ultraviolet rays) is characteristic of the Southwest or desert climates while fungus growth is associated with the humid climate of the South. Add the variables of a home's age, surface finish build-up, special deteriorating conditions and you realize how extensive the research and testing must be to produce quality house paint.

Typical paint problems include:

- *Blistering,* the most common failure, occurs when moisture locked in siding is drawn from the wood by the sun's heat. Moisture under a tight paint film will also vaporize and expand to form blisters.
- *Peeling* occurs for several reasons. Most often it is caused by applying oil paint to a moist surface. It also occurs when new paint is applied over several thick coats.
- *Cracking* generally results from a paint that has aged to an excessively hard finish. Hairline surface cracks permit water to seep into the wood; this causes flaking.
- *Alligatoring* is caused by an improperly built-up paint film.

Every home requires individual attention to repair deteriorating sections and to prepare surfaces properly for painting. According to William S. Rosenthal, technical marketing manager for PPG, "Common problems such as peeling, blistering and cracking rarely occur when a quality paint is applied to a properly prepared surface."

For how to do that, turn the page.

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strengthened the importance of the role of design and color tradition.

What it does mean is that colors traditionally associated with a major geographic area are no longer the exclusive domain of that region. For example, the primarily wood stain finishes that are associated with California and the Northwest have moved East. Stained homes can even be found in the historic white clapboard country of Connecticut and Massachusetts.

But heritage impressions—though perhaps not as strong in character as a decade ago—do last. Here's how Americans are currently painting their homes:

■ New England is still basically white. But muted historic colors of the coastal cities are moving inland. One paint dealer in Glastonbury, Conn., estimates that 80 percent of his sales in exterior paints are now in historic colors.

■ The South continues to use white and pastels. White, for instance, is still No. 1 choice for Florida's stuccoed homes. But, in Old Charleston, S.C., neutrals and other pastels are judiciously mixed with white to reflect the primarily Georgian quality of architecture.

■ Midwest. In this section of the country—the farm belt—rural colors persist. The Victorian farmhouse on the preceding page typifies the current color preferences of this area.

■ Southwesterners pick colors that relate to surrounding terrain. In Santa Fe, N.M., much of the color character is related to tradition and maintaining architectural and design heritage. The colors, not so incidentally, are also functional—they resist dirt and provide good color retention in spite of harsh sun.

■ West. In general, lifestyles on the West Coast are more informal than elsewhere and the color preferences reflect that attitude. There is extensive use of cedar and redwood siding on low-slung homes that nestle into hillsides. Muted golds, avocado and earth tones prevail and blend handsomely with surrounding terrain. But homes in urban areas tend to be painted with bright colors that reflect a greater degree of individuality (see photo on page 92).

Old favorites still prevail

Colors that have been regional favorites still are. The difference today—as compared to a decade ago—is that colors no longer seem to be confined to areas. In other words, people are using the colors they like—no matter where they live.

Preparing your home for paint

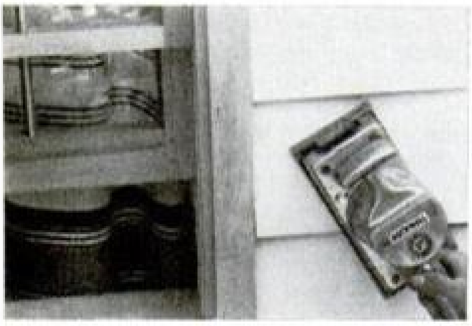
Start by making a careful inspection of the entire house. It's a good idea to bring a pad and pencil along with you so you can write down any irregularities you spot or note any areas that need particular attention or prepainting preparation. Look for trouble spots where paint failures occur most often: at window and door frames, around steps, behind gutters and downspouts, and under eaves. Particularly check areas where moisture accumulates, for example, where a patio butts against house siding.

If you have an excessive amount of peeling, cracking or blistered paint, it will be necessary to remove the old paint before starting to repaint. Spot removal can be accomplished by using a hand scraper and then feathering the old paint—with a disc sander—for a smooth transition into raw wood. On heavy removal tasks, a belt sander can save a lot of back-breaking rubbing; use an open-coat paper, such as 40-grit, to start and work your way up to at least 100-grit. Sand the surface thoroughly before applying any paint.

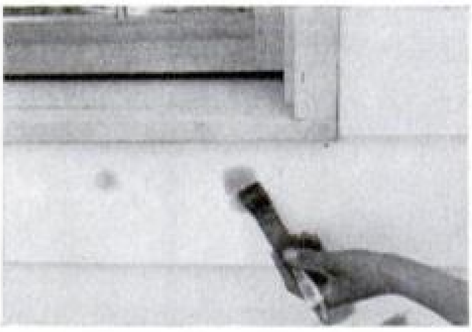
Cracks, holes over nailheads and the like should be filled too. Fillers that are formulated for exterior use are available from your paint dealer.

If surface conditions are generally good, prepainting work is greatly simplified. Most professionals give siding a going-over with a wire brush to rid the surface of heavy dirt. If the house exterior is just plain dirty, it makes sense to wash it down with a solution of household detergent and water. Use the garden hose to give the surfaces a complete rinsing and make sure siding is absolutely dry before applying an oil

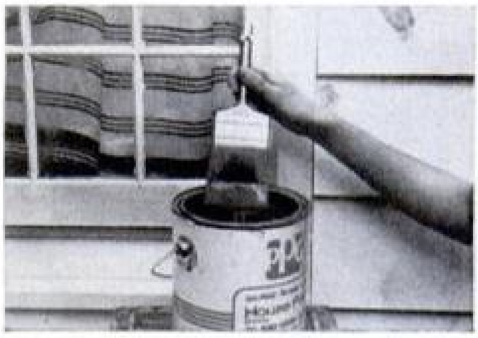
PREPARING AND PAINTING SIDING



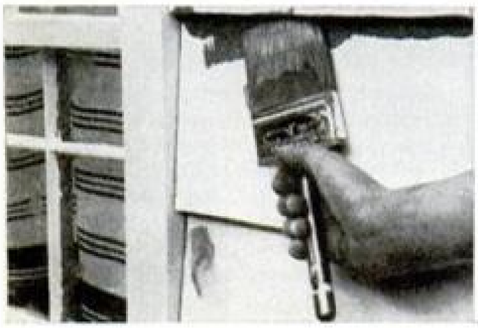
After giving siding a careful visual check, sand any rough areas smooth and dust off.



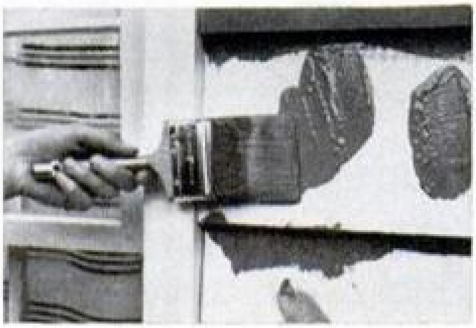
On new bevel siding, seal all knots with dabs of primer or aluminum paint as here.



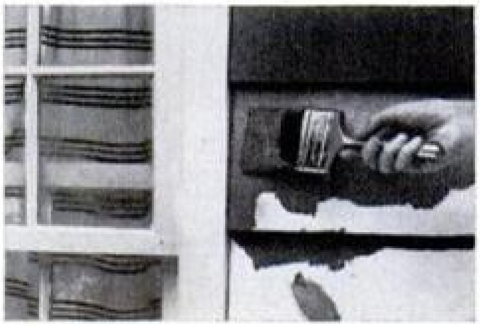
Dip bristles halfway into paint, tap brush against side of can to remove excess.



Paint butt edges first on clapboard or shingles; do a 3 or 4-ft. run at a time.



Apply healthy paint blobs to weather face of siding, then brush surface smooth.



End painting with smooth uniform strokes, then carefully cut-in around painted trim.

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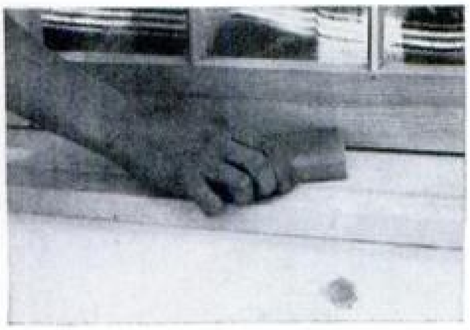
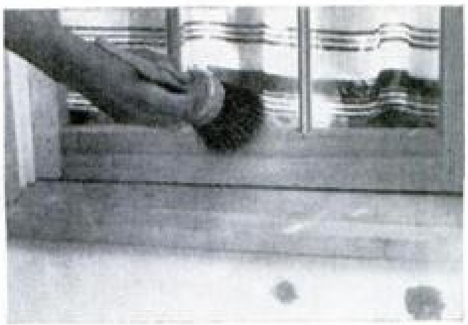
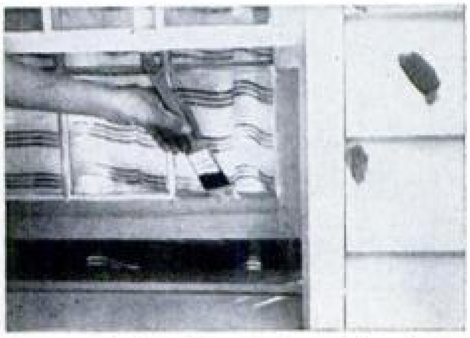
PAINTING WINDOWS



Sand all surfaces of window and trim whether they are new wood or painted.



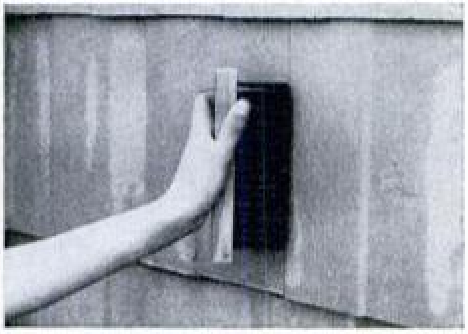
A paint-free dust brush removes all dirt particles before the paint goes on.



Use a sash brush to cut in muntins. Apply a primer before reglazing where needed.

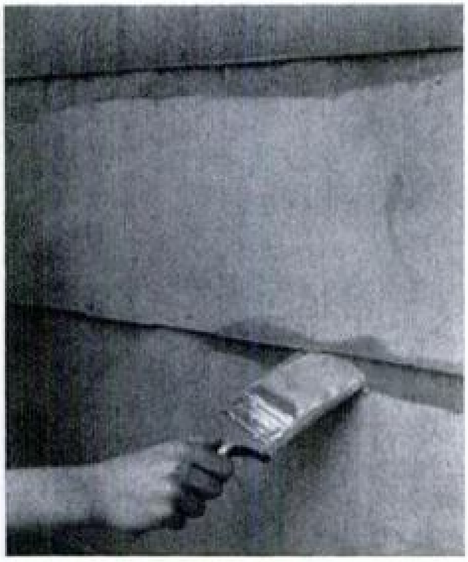
Apply the finish coat; when dry, remove paint left on glass with a razor blade.

PAINTING TEXTURED SIDING



Use a wire brush to clean textured siding. Hose off particles if latex paint will follow.

Foam pad painter is a first-rate painting tool for covering the rough surfaces.



For thorough coverage, use 4-in. brush to paint the textured siding's butt edges.

Pad painter is then used for speedy and relatively easy coverage of weather face.

base paint. If you are using latex paint, you can start to apply it immediately after the hosing-down job is finished.

About burning off

Many homeowners are tempted to speed up paint removal by burning with either a blowtorch or propane torch. There's no doubt that this method does remove paint speedily, but it also brings with it the risk of serious fire damage. If you must use a torch, keep a garden hose at the ready on the ladder with you. To be safe, soak down each section as you finish flaming it.

To have paint flamed off by a professional is prohibitively expensive because of the soaring cost of insurance premiums.

Painting basics

Start by getting your tools together: You will need the right-length ladders, dropcloths for protecting shrubbery, brushes, ladder hooks (for holding paint cans) and, of course, brushes. If you are using an oil-based paint, you will also need a solvent such as turpentine for clean-up. For water-based paints, brushes and tools can be cleaned with soap and water.

A 4- to 5-in. brush is best for painting the larger surfaces. Anything smaller doesn't transport enough paint from can to wall. A too-large brush will wear you out because of its weight. You should also buy a 1½- or 2-in. sash brush for cutting in—that tricky painting on windows.

In most cases, it is best to figure on a two-coat application—a prime coat and the finish coat. Start the job by priming and painting windows—so ladders won't be leaned against newly-painted siding. When windows are done, the siding can be painted.

Start at the top of your house and work your way down to ground level. If possible, try to work on relatively dry days when the temperature is above 50°F. If you can, work on the shady side of the house; that is, try to paint the west side during the morning and the east side in the afternoon.

Finally, do take the time to carefully pick the products that you will use on your home. Be aware that the paint must be compatible with the surface to which it is to be applied. If it isn't, there's a strong likelihood that the new paint and the old surface will quickly separate. Do take the time to read the manufacturer's instructions carefully. ★★★

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Imaginative remodeling: TWO ROOMS FROM ONE

Carefully planned furniture "divides" a bedroom. Here's how you can do it!

by Harry Wicks
HOME AND SHOP EDITOR

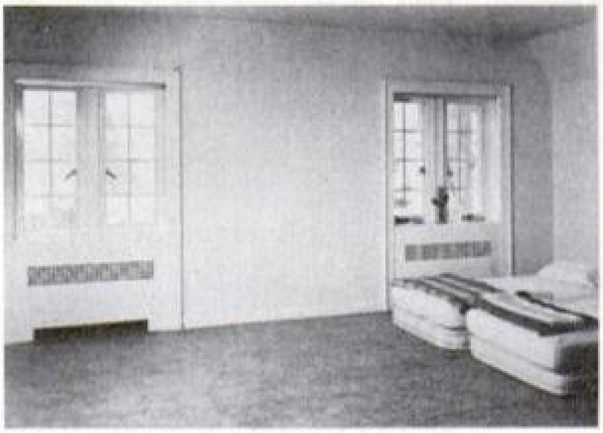
One sure way to keep the peace in a bedroom shared by two active boys is to split the room in two. To do it by installing a wall can prove prohibitively expensive as well as unrealistic from a space point of view. Here, the breaking up of a large bedroom occupied by a teenager and his pre-teen brother—a difficult pairing at best—was accomplished through the clever use and placement of built-in furniture.

To do it, interior decorator Abbey Darer created a bed-wall unit that serves a number of purposes:

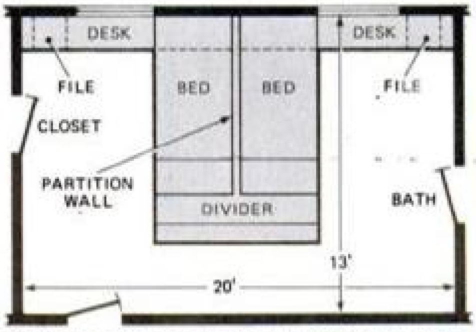
- It physically divides the room down the middle. Now, hassles about whose whatsit belongs where are a thing of the past.
- Each youngster now has a bunk bed—with storage to spare—as well as a guest bunk overhead.
- Since homework and a quiet place to study were at the top of the list as far as the parents were concerned, each boy was also given a desk/study area of his own. Besides providing quiet spots for homework and reading, these areas also serve as hobby centers.

For beauty and rugged durability the walls are clad with prefinished ¼ - in. - thick paneling—Weldwood Wayfarer Birch from Champion Building Products. For looks, the beds and bookcase unit were finished with the same paneling that is used on the walls.

Each youngster's half of the room was then decorated with touches that suit his own tastes and interests. Yet,



Before: Large windows in one wall made efficient furniture placement impossible.



Strategically located bed-wall unit provides each youngster a desk/study area.

as can be seen in the overall view above, careful decorating keeps the room together as a whole visually—it doesn't look like two rooms shoehorned into one.

The windows in both areas are treated with custom-decorated Bolero shades from the Graber Co.

See-through section in bookcase gives an open, airy feeling in the lower bunk. Shelf is ideal for displaying collections, models and other hobby items.

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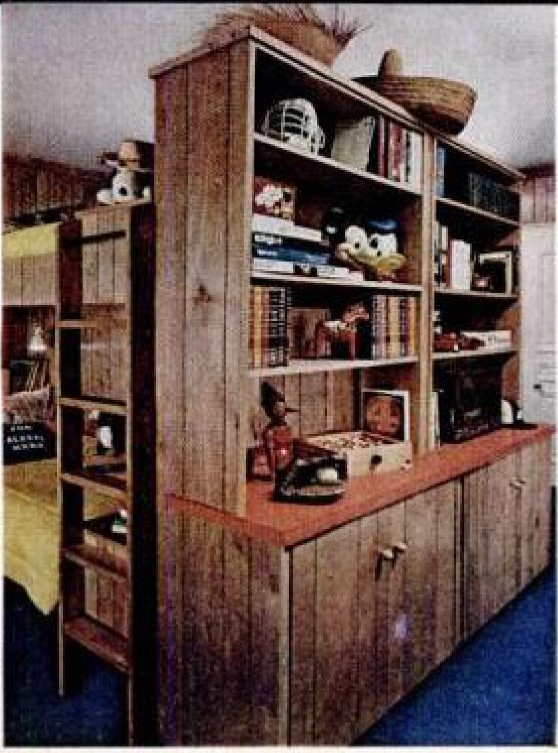
By building the bed/wall unit in the middle of the room, two distinct areas were created (see photo at top of facing page). The idea was to give two children—one teen-age and the other a preteener—their own part of the house. Besides privacy, each now has his own study-hobby desk area as well as an extra bunk for guests.

PM photos: Vincent Lissant



Storage niche (above) is at the head of each lower bunk. Upper bunk has storage at foot (see drawing on next page). Bookcase shared by room occupants has same prefinished plywood as walls.

Each shade sports its own graphics, as well as the occupant's name. You will find instructions for decorating shades—including an alphabet on squares—beginning on page 172. Since the shades provide decorative relief, no other materials are used at the windows. This clever touch saves dollars as well.

Building the divider

Since the T-shaped wall does not support any weight from above, it can be framed using 2x3 lumber. Start by laying out the wall where you want it, indicating its location on the floor by a chalkline. In the room shown, ceiling height is 8 ft. and the bed wall is built 7 ft. high. This leaves a 1-ft. space between wall and ceiling for air (and heat) flow. Erect the two wall sections and stand

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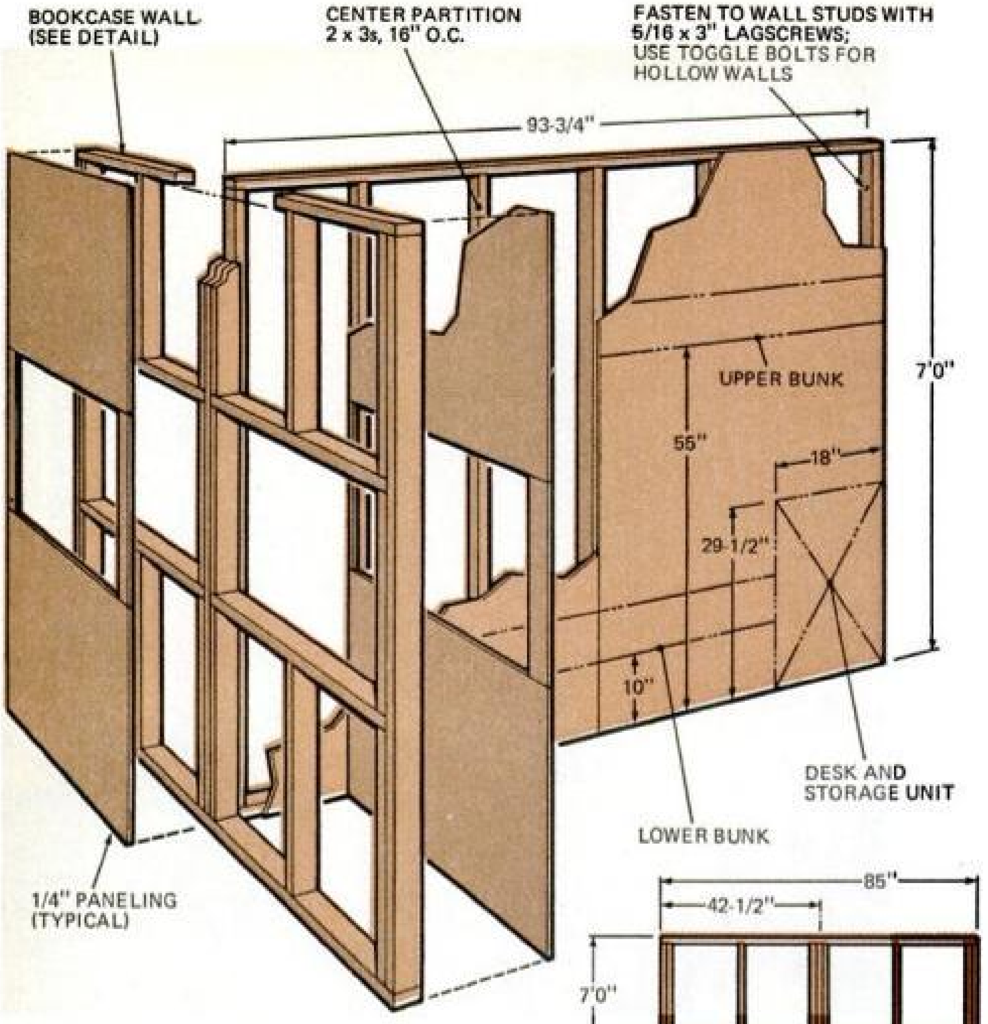
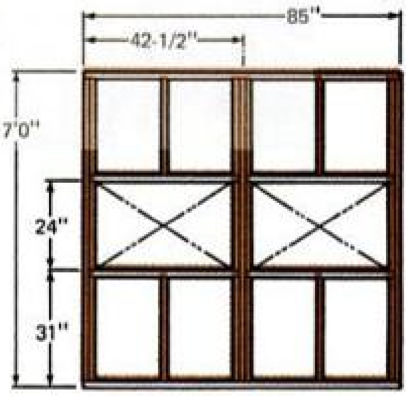
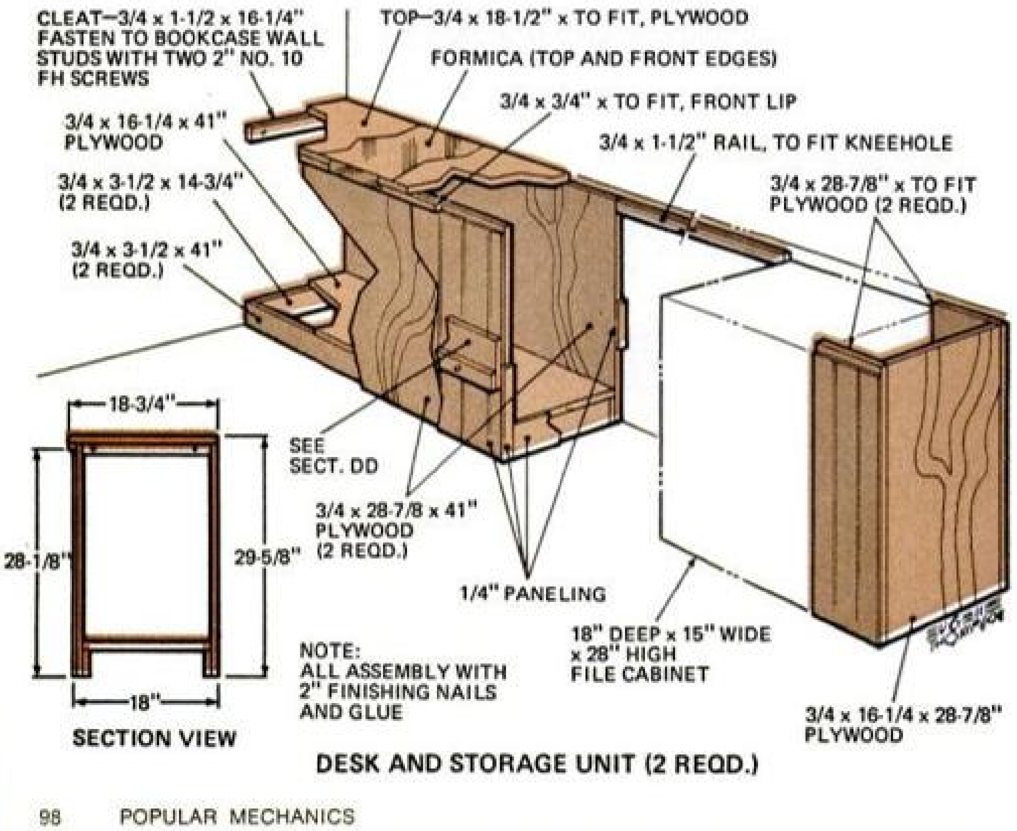


NOTES
2 x 3 FRAMING JOINED WITH 8d COMMON NAILS
1/4" PANELING FASTENED WITH PANEL ADHESIVE AND 1-1/4" PANEL NAILS

PARTITION ASSEMBLY



BOOKCASE WALL



SECTION VIEW

DESK AND STORAGE UNIT (2 REQD.)

them in place. Once the bookcase back wall is nailed to the bed wall, the assembly will be free-standing. Since the beds and bookcase unit will ultimately be tied into the wall unit, there is no need to fasten its sole plates to the floor.

When you're satisfied with wall dimensions and location, install prefinished paneling on all wall elevations—including the surface that will be the back of the bookcase unit. For a superior panel installation use adhesive on studs as well as 1¼-in. color-matched nails.

Next build the desk units

The chore here is simplified because on both units the outboard end of the corner simply rests on a purchased two-drawer file cabinet. At the other end, a boxlike enclosure is constructed to make up this dimension. The side facing the kneehole is left unfinished to provide handy storage for large, bulky items. Note that the storage box is completely finished (paneled) before bed construction begins. The work counter is finished by applying a high-pressure laminate (such as Formica) which blends with the room—and can take the abuse dished out by boys.

Building the beds

Start by cutting 1x8 pine to lengths required for the side and end frames. Notch each end of the side frames so that they can rest on the end ledger strips. The notches will be concealed later by paneling. Assemble the inside and then end frames to their respective walls using lagscrews into wall studs (see section drawings). If you must fasten between studs, use toggle bolts. Then install ledger strips on all three frame members. Finally, install outside frame and ledger strip. (Note: Install the ledger strips on all four sides using white glue and 1¼-in. ringed nails.)

Install the two rib members and cut the plywood platform to suit. If you cut the plywood neatly, it can simply float in its niche; there will be no need for fastening it.

Storage boxes at the bottoms of both upper and lower bunks are fashioned by attaching 1x3 stock to the frame members with mending plates and screws. One box end is cut from 1x7 stock so that it can be notched to rest on, and be toenailed to, the plywood platform. Their covers are simply lift-off rectangles of plywood. The upper bunk unit is built in exactly the same fashion as the lower.

Assemble the ladder as shown. After assembly, its front edges are shaped using a beading cutter in a

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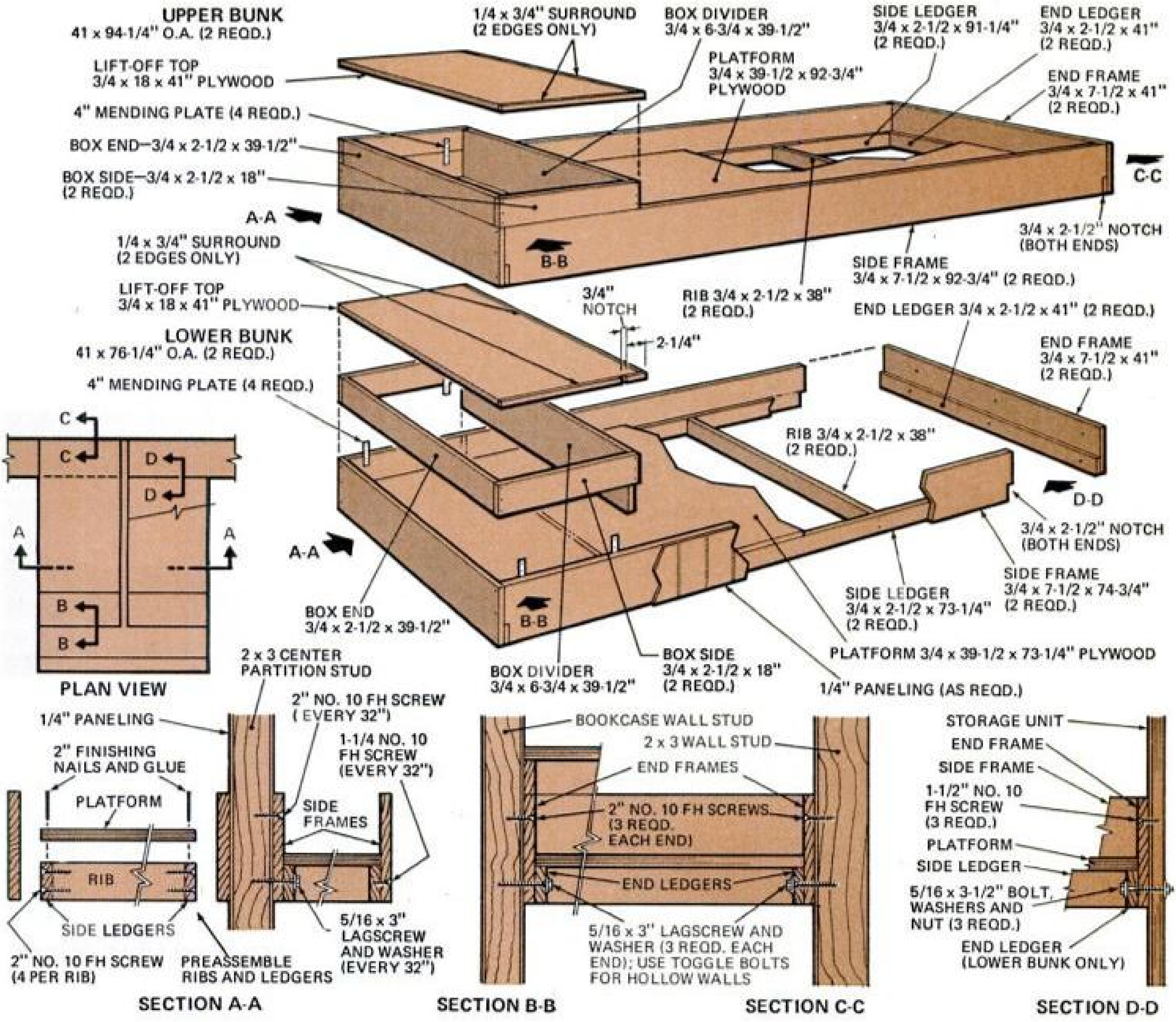

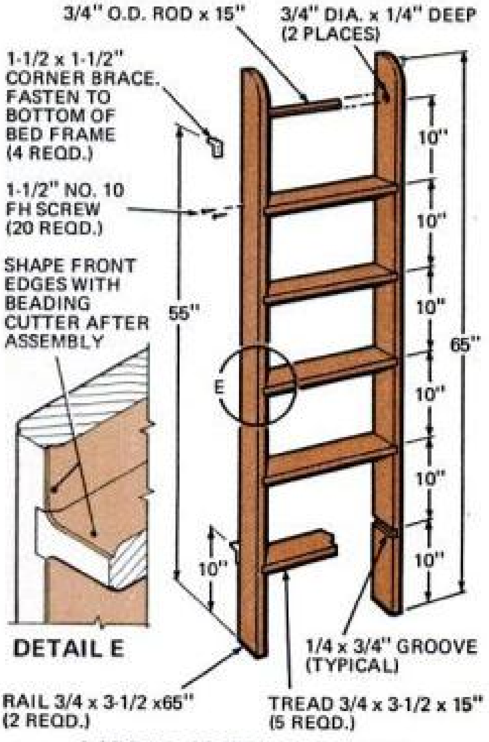

LADDER ASSEMBLY (2 REQD.)

router. If you lack a router, use a plane and sandpaper to break (round over) all sharp corners so they will be splinter-free. The ladders are permanently attached to the bunks using corner braces and screws as shown in the drawing.

Finally the bookcase

The version shown has two pass-through areas which serve a dual purpose—these let light into the lower bunks to avoid a dark, gloomy look as well as providing a shelf for displaying collections.

Building the bookcase is the trickiest part of the job. For that reason, study the drawing carefully before making your cuts in plywood. Work as the professionals do by first laying out the pieces to be cut and then double checking them before touching the wood with your saw.

Assemble the unit using glue, nails and screws as indicated. When the bookcase unit is completed, it—as well as the beds and desk storage units—can be covered with pre-finished paneling.

Use moldings where needed but don't overdo it. You can save some money by working with unfinished pine moldings, but then you will have to mix stain to match the paneling and seal the wood with varnish. A simpler method, obviously, is to stick with the prefinished moldings that are sold to match the paneling.

Decorating the shades

PM Artist Don Mannes created the designs on the shades shown on the preceding pages using acrylic paints and the methods shown on page 172. To start, create your design on bond paper and then rub the back with a soft pencil so design elements can be transferred.

Tape the design to the shade and use a hard pencil to outline it. Lift the drawing to make certain all elements have been transferred before removing tape. Next apply a strip of

(Please turn to page 170)

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Winners in PM's paint-job photo contest

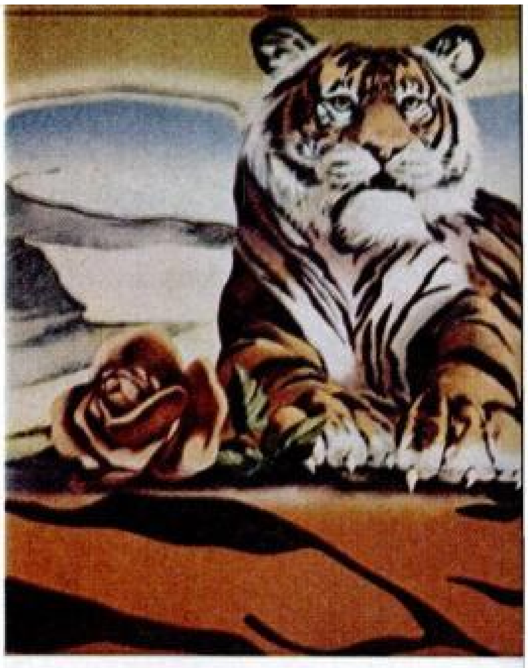
Van and RV owners are artists at heart. PM readers proved that as soon as we announced our Paint Job Photo Contest in the March issue. We were flooded with pictures that displayed design work of even better quality than we expected.

After several judging sessions—accurately described as "pleasantly difficult" by one judge—we picked the six entrants on these two pages as winners of the $100 awards. There were others too good to pass by so we've included them as runners-up.

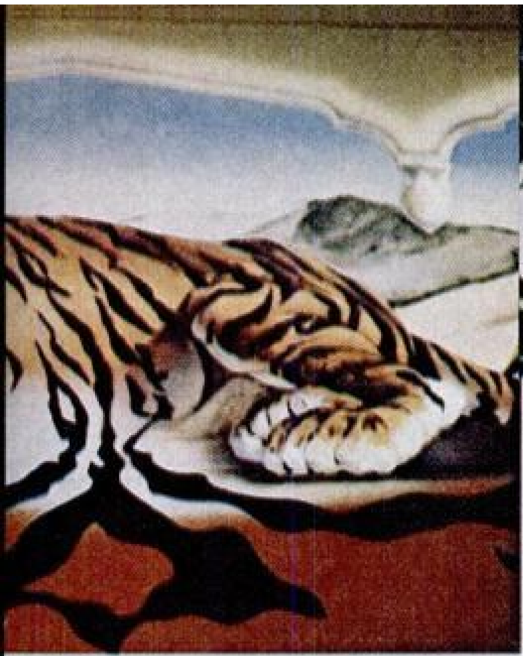
No section of the country has a monopoly on four-wheeler imagination; surrealistic artwork arrived postmarked all the way from Maine to California. Some entrants are apparently so successful with their

(Please turn to page 176)

Jungle-on-the-go design is a winner for James Edge of Lisbon Falls, Me., where you don't usually see baboons and elephants—or even imaginative paintings of them.



Underwater action won an award for Gregg Glatkowski of Hanover Park, Ill. His



If the cold-eyed tiger doesn't stare you down, the owl in back should do the job when you follow Kip Panko's prize-winning van in Allentown, Pa.

Van decor has been out of this world for years. Richard Davis of Brooklyn, Conn., proves it with his surrealist-special winner (right) showing an outer-spacescape.

seafood platter of deep-water denizens ranges from minnows to monster sharks.

The Mountain-mover winner (above) comes from Raytown, Mo., where Richard Phillips rolls along with landscape that crosses Monument Valley with mountains of the moon. The judges also admired the cutaway cab treatment.

Paint your wagon with a cross between a Chinese landscape and a southern swamp setting with the cypress hung with Spanish moss. Result is a paint-job award to David Eschete, Houma, La., for his family wagon handiwork (left).

Материал, защищенный авторским правом

Mountaintop or canyon, now any place can be a campsite.

Ahead, piercing the horizon, are snow-topped peaks of the San Francisco range above Flagstaff, Ariz., with virgin ski slopes just waiting for us alone. Down from the foothills twist magnificent canyons with sheer walls of colored rock dropping to tiny untouched sand-bar beaches beside crystal water—unspoiled, unexplored and summoning us to dive in for a cooling escape from the hot desert sun. Directly below, 1000 feet straight down, we follow a Phoenix highway jammed with cars, trucks, motorcycles, travel trailers, motor homes. Above it all we ride in an Itasca Heli-Home, as we leave civilization behind for an exclusive *Popular Mechanics* preview of the camping that is to come—at least, for those who can afford it.

No ancient sultan on record thought of stashing a refrigerator, stove, TV, beds and a bar aboard his flying carpet, but some of his oil-rich descendants may prefer this modern 1500-hp improvement.

All the comforts of home

PM's test model has seats and dinette that convert to sleep four, a 3500-watt generator to power the two-burner electric range, 4-cu.-ft. refrigerator and 6000-B.T.U. air-conditioner.

But if the night is already chilly, a 40,000-B.T.U. Janitrol furnace will make our cabin cozy again while drinks and a meal are prepared from supplies in generous galley cabinets. One built-in water heater supplies the kitchen, while another provides showers and hot basin water in the bathroom aft. An airline-type chemical toilet, plus galley and bathroom holding tanks, protect the environment wherever the Heli-Home might land so that no trace is left of its passing. Only a little blown snow, scattered beach sand, desert dust or prairie grass might hint for a day that campers of the future once touched down.

This ultimate RV was not born, however, as such a many-splendored thing. Created by Fred Clark of Orlando Helicopter Airways in Florida and engineers and designers of the Itasca Div. of Winnebago Industries, noted RV manufacturer of Forest

by Bill McKeown
OUTDOORS EDITOR

A FLYING RV—THE ULTIMATE CAMPER

City, Iowa, the Heli-Home is based on a conversion of the war-proven Sikorsky S-58. At 46 feet overall and 15½ feet high with a 56-foot rotor diameter, it weighs in at 9200 pounds empty and has a useful load of 3300 pounds. Powered with a Wright R-1820-84 radial 1525-hp engine, it has a flight range of about 3½ hours at 100 to 110 mph from its 266 gallons of gas. That should be plenty. The perfect fishing lake is often just 40 inaccessible miles up in the mountains, and that deserted tropic island paradise may well be only 70 miles offshore.

Getting away from it all

Finding those pefect wilderness spots that are often only a dot on some explorer's map should be no

(Please turn to page 148)

An off-road RV that goes everywhere, the Itasca Heli-Home from Winnebago, built by Orlando Helicopter Airways, sits down in remote corner of an Arizona canyon (below) while PM high-flying testers Frank and Cindy sit down for a camp-out meal completely away from it all in their choice of perfect setting. Copter (right) can search for ideal campsites at 110 mph, then hover to select best touch-down spot. Meals en route, prepared in fully equipped galley, are enjoyed at dinette (lower right) in 115-sq.-ft. cabin seating four. Bathroom with toilet, wash basin and shower is at rear of main cabin. AM-FM radio plus cartridge tape stereo system, of course, provides music en route in the fairly noisy interior. Hatchway (bottom) allows passage up to cockpit where pilot and copilot or another passenger or navigator ride. Dual-control cockpit can also be entered with steps and handholds up the outside. RV is conversion of the combat-proven Sikorsky 1525-hp S-58.

PM photos: Jim Tallon

Ralph Therrio—49.38 mph

Jerry Ash/Gibby Hatton—49.93 mph

Bill Watson—44.74 mph

. . . and before his run in his Supine Recumbent sans top fairing.

Wilmot White—28.48 mph

Randy Danta—Crashed

Winner of the third International Human Powered Speed Championship at Ontario Motor Speedway in the singles category was Ralph Therrio on his Prone Recumbent Streamlined Hand and Foot-Powered Quadracycle with a speed of 49.38 mph. Honors for the fastest pedal-powered machine in the world, however, went to Jerry Ash and Gibby Hatton in the multiple rider category on a Streamlined Standard Racing Tandem—49.93 mph!

The sensation of speed—of going as far as you can in the shortest possible time—is all relative, of course, so it's most sensational the closer you are to the ground. The other part of the experience is the wind in your face, as any bicyclist knows. But when you're trying to pedal as fast as you can, wind resistance becomes a real drag. Strong legs can do just so much to overcome this blockage to speed, as the competitors at this year's Human Powered Speed Championship know. They also know that the secret to speed is streamlining, and that's why the self-propelled bikes shown here have the shape they do.

All of the pedalers at this year's event at the Ontario Motor Speedway

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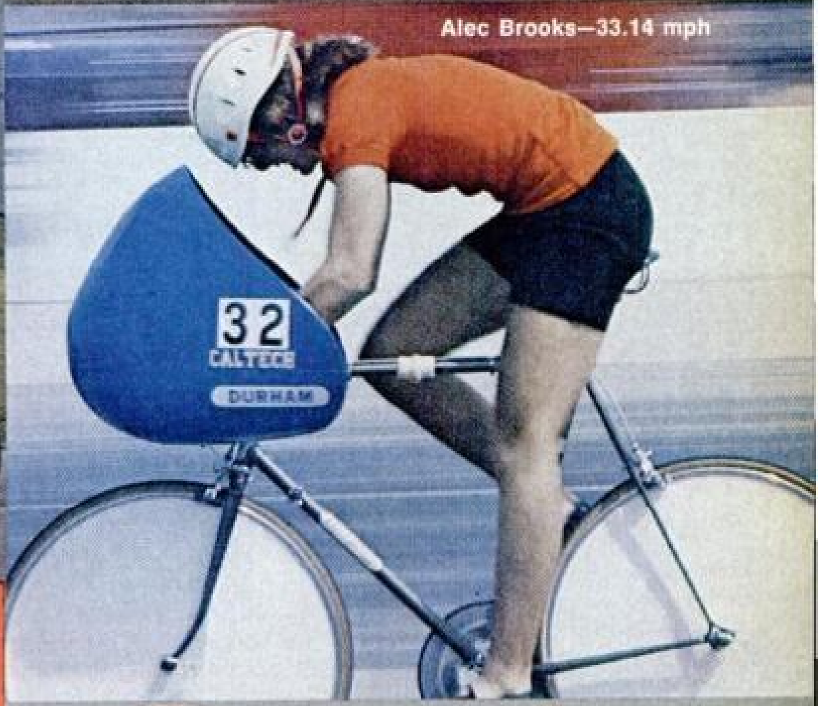
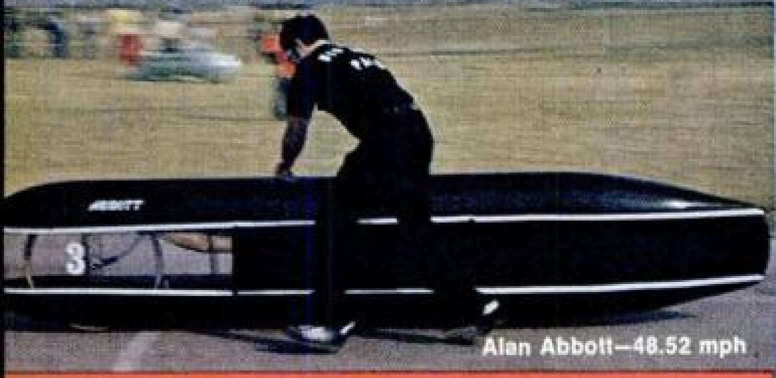
Darryl LeVesque/Dave Keffer/Mark Orr—48.11 mph

Norman Gall—42.65 mph



Alec Brooks—33.14 mph



Alan Abbott—48.52 mph

Joseph Mastropaolo—30.15 mph

PM photos: David Gooley

STAYING UNDER 55 MPH (BUT NOT BY MUCH!)

Okay, Mac, pull over . . . I want to take a look at your funny bicycle.

by Bill Hartford
AUTO EDITOR

in California were out to test themselves and their designs against the clock.

While rocket-car drivers dream of setting a land speed record faster than the speed of sound, this cadre of ingenious bicyclists was shooting for a more modest goal—breaking the national speed limit of 55 mph. The runs are made with a flying start and are timed over a 200-meter stretch. In the third annual event, the 50-mph mark was missed by a whisker, but Chester Kyle of the International Human Powered Vehicle Assn. is confident that someone in a future meet will hit double nickels. If you want to try, contact Kyle, c/o the California State University, Long Beach, Calif. 90840. ★ ★ ★

Second place in the multiple rider category went to a Streamlined Triplex with three riders up—LeVesque, Keffer and Orr: 48.11 mph. Alan Abbott, in a slick Prone Recumbent, took second in the singles category with his 48.52 mph. Alec Brook's 13th place finish was impressive since his run of 33.14 mph was made on a Partially Streamlined Standard Bicycle. On Bill Watson's machine the "landing gear" is retractable!

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Your cooling system: All you need to

by Mort Schultz

Full understanding of the systems in your car is necessary before you can take care of them. This is the concluding part of the cooling-system story that began last month. Other essential systems will be discussed in future issues.

The thermostat is an important cooling-system component. Its job is to maintain engine temperature within defined limits, thereby overcoming the effects of air temperature, atmospheric pressure and operating load. Were it not for the thermostat, these factors would cause a wide swing in engine temperature.

When an engine is cold, the thermostat is closed, preventing circulation of coolant and enabling the engine to attain more quickly the temperature at which it operates most efficiently. As the engine warms, the thermostat opens and allows free circulation of coolant. A properly functioning thermostat opens and closes frequently in response to fluctuations in engine temperature.

The results of driving with an inoperative thermostat are overheating and overcooling. The latter is more of a threat, oddly enough, because few drivers would operate an engine with the temperature gauge needle registering "overheat." However, some think all is well as long as the engine isn't overheating; even when the temperature gauge needle barely moves off the "cold" mark.

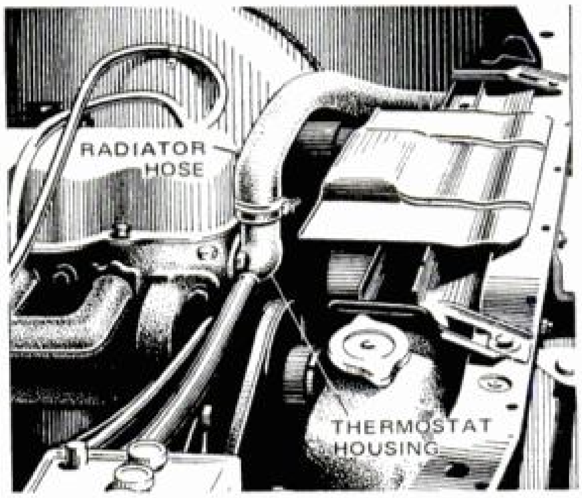
Adequate heat is required by an engine to dispel harmful byproducts and condensation, and to aid in complete combustion. An engine that doesn't attain normal operating temperature wastes gasoline, dilutes lubricating oil with unburned fuel, and contributes to sludge formation and corrosion.

Like any moving part, a thermostat will eventually falter. To assure yourself that the part has not failed, test it as follows:

- With the engine cold, drain the cooling system to below the thermostat housing. No need for complete draining.
- Disconnect the top radiator hose and take off the thermostat housing.
- Remove the thermostat and thoroughly clean the contact surfaces of the thermostat housing. Make sure all gasket material, cement and residue are cleaned off to assure a tight, nonleaking seal when the housing is reassembled.
- Note the temperature rating marked on the thermostat.
- If this is your first experience in testing a thermostat, hang the thermostat in a pot of boiling water for a few seconds. Then run it under a flow of cold water, watching it closely. The control valve should move. This is the critical part.
- Hang the thermostat in a heat-resistant glass pot filled with cold water. The thermostat should not touch the bottom of the pot. Insert a high-temperature, waterproof thermometer and put the pot on a stove.
- Keep your eye on the thermostat valve as the water gets hot. At first, the valve should be closed. It should open gradually as the water heats up. You may not be able to detect movement, but the valve should be fully open within 10° F., plus or minus, of its rating. This you will see. If the thermostat fails the test, get a new one.

Important: A new thermostat should be rated at the temperature specified by the car's manufacturer.

- Insert the thermostat in the engine. Use a new gasket. Reassemble the housing and radiator hose. After refilling the radiator, check for leaks and for proper circulation of coolant by warming up the engine and seeing to it that the heater is delivering warm air.



Location of thermostat is typically in a housing at end of radiator's top hose.

Role of the drive belt

Don't take drive belts lightly. They are vital components. Without a belt to drive a car's water pump and fan, not to mention the alternator and power-steering pump, you aren't going anywhere.

Your car could have one, two or three drive belts, depending on the number of systems it possesses that have to be belt-driven. The belt we are concerned with here is the one driving the water pump, fan and alternator. Every car has it.

If your car has a power-steering system, it probably has a second belt, and if it's equipped with air-conditioning, it may have a third belt. What's said here about one belt applies to all.

Just looking at a belt will tell you if it's seen better days. Replace a frayed, cracked or cut belt.

Also examine the pulleys, which are ignored too often. Belts are designed to ride the sides of pulleys. They should not touch the bottom of a pulley's groove. The sides of a pulley may have a polished appearance. This is normal, but if the bottom of the pulley groove looks polished, the belt is either adjusted much too tightly or the pulley is worn. Readjust the belt or replace the pulley.

When installing a new belt, check the sides of pulleys for rough spots that could damage the belt. Try to smooth them with emery cloth. Also check pulleys for oil or grease that will cause a belt to slip and deteriorate.

If a cooling-system drive belt is too loose, it may cause overheating and affect alternator output. A belt that's too tight puts excessive strain on driven components, such as water pump and alternator bearings.

Belt adjustment should be measured with a professional belt-strand

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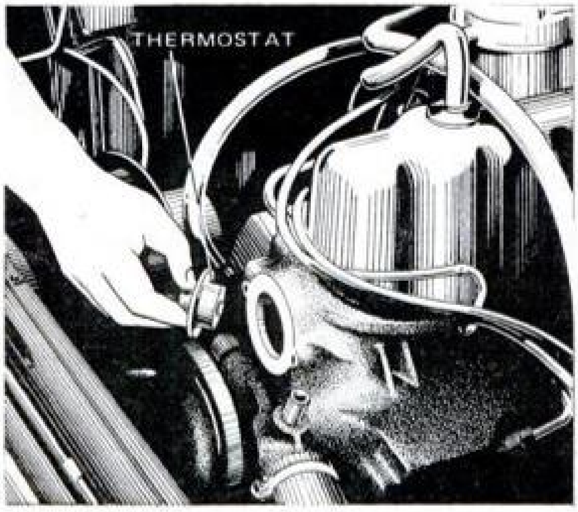
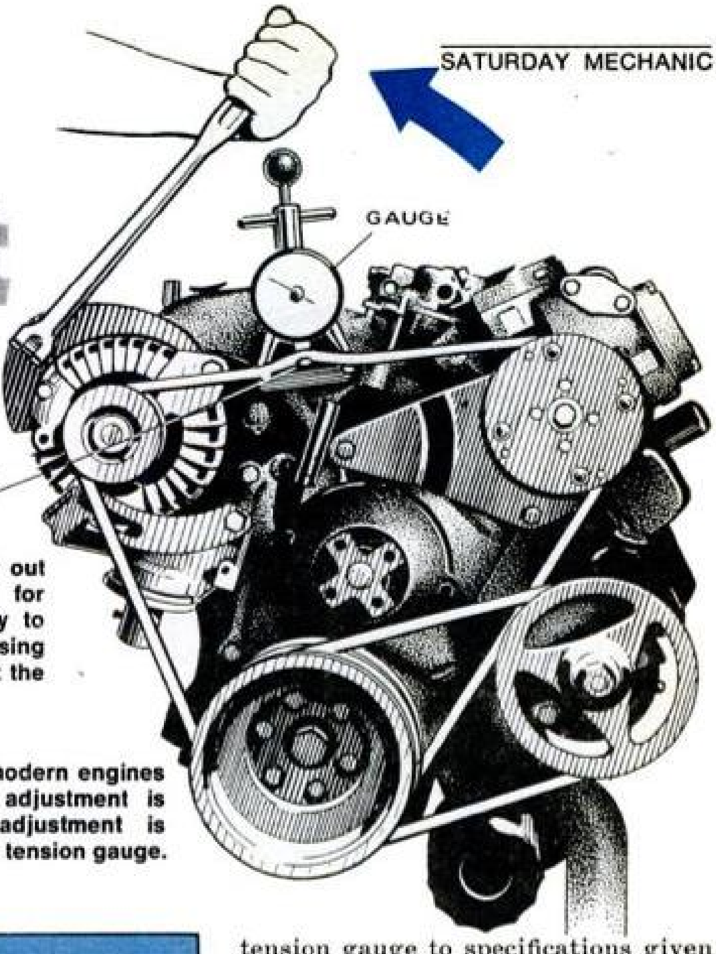
know about it



Take thermostat out of its housing for testing. It's easy to remove the housing bolts and lift out the thermostat.



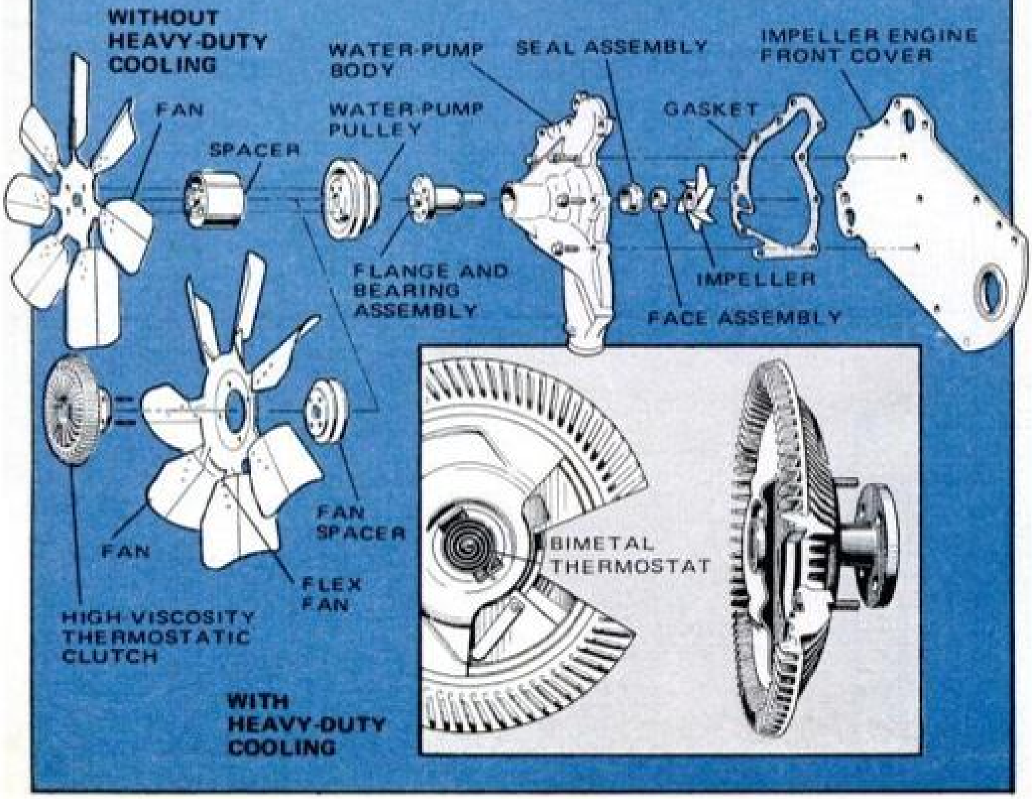
Drive belts on modern engines are many and adjustment is critical. Best adjustment is obtained using a tension gauge.

THE ROLE OF THE FAN

The fan, which is mounted on the water-pump shaft, assists in cooling hot coolant as coolant flows through the radiator back to the engine. In recent years, especially on cars equipped with airconditioning, a thermostatically controlled fluid clutch fan has been employed. It is detailed in the inset below.

Typically, the fan clutch engages when additional airflow is needed to reduce coolant temperatures. In other words, when the temperature of air flowing through the radiator is below 150°F, the fan clutch is not engaged and fan speed is below 1400 rpm.

However, at higher temperatures, a sensor (thermostat) causes the clutch to engage. This increases fan speed to increase cooling.



tension gauge to specifications given in the carmaker's service manual. Two specifications are generally provided: one for new belts and one for belts that have been in use.

The gauge is placed on the belt midway between the pulleys and upward pressure is applied on the belt until the dial records maximum tension. If tension isn't to specification, readjust the belt.

If a belt-tension gauge isn't available, place a straight piece of one-by-two lumber from pulley to pulley. Midway between pulleys, press on the belt with a ruler, so the ruler is next to the piece of wood. You can then determine the amount of belt deflection. Suitable deflection is between 1/4 and 1/2 inch.

If you have to adjust a cooling-system belt, the usual practice is to loosen the belt-adjusting link (normally the alternator bracket). Pull the alternator away from the engine to increase belt tension. Push it toward the engine to lessen tension. Tighten the bracket bolt and recheck tension.

Caution: If you must use a pry bar to increase tension, place it against the center of the alternator. Applying pressure with a pry bar to the end caps may damage the alternator.

The role of the water pump

The water pump circulates the coolant. It is a very reliable part, but it could fail. An early indicator that the pump is failing is coolant

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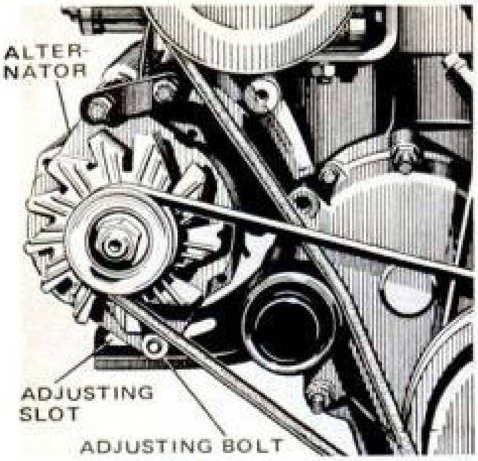
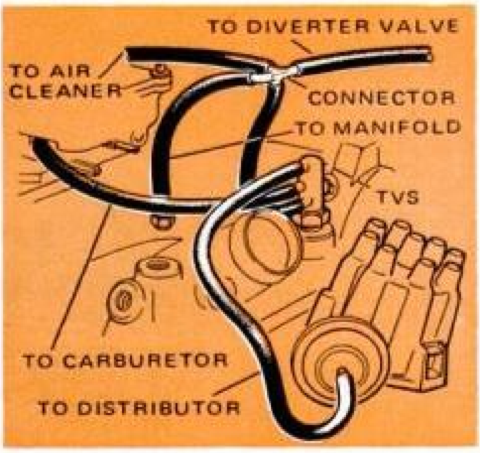
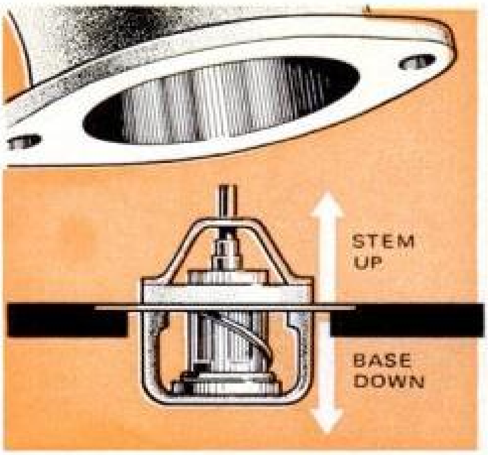


Adjusting mechanism for the alternator and water-pump belt is typically a bolt/slot arrangement on alternator.



Thermostatic vacuum switch (TVS) is located as indicated on late-model cars produced by General Motors.



Thermostat installation must be done as shown here, since this device acts as a one-way valve for coolant.

leaking from the water-pump housing. Run your hand around the housing to see if a leak exists.

In an extreme case, water pump failure results in a sudden, complete loss of coolant.

Typically, overhauling a water pump requires replacement of old gaskets, seals, impeller, shaft and bearing (if noisy). This is not particularly difficult, but it takes time and is more involved with some engines than others.

Generally, you have to drain the cooling system and remove the battery, radiator hoses, fan shroud and belts. Usually airconditioner components must be loosened and shifted aside. The radiator may have to be removed to gain access.

Getting to the pump is the tough part. It isn't difficult to disassemble the pump body and replace parts, which are contained in a rebuild kit.

Finding coolant leaks

When coolant level drops from one refill to the next, there is a leak. Sometimes you can find this by examination, but other times it is apparent only when the system is under pressure with a cooling-system pressure tester, the virtues of which we discussed last month.

To uncover a leak, proceed as follows:

1. With the engine cold, remove the radiator pressure cap, wipe the inside of the filler neck clean and see that coolant level is 2 to 3 inches from the bottom of the filler neck.
2. If the car has an overflow tube, inspect it for internal obstructions by running a wire through the tube. This tube must be clear to allow excess pressure created during the test to escape. An obstructed tube could allow trapped pressure to burst the radiator or some other part of the cooling system.
3. Attach the pressure tester to the radiator filler neck.

Important: You should know the system's correct pressure. If not, check specifications or the radiator pressure cap which has the correct pressure stamped on it.

4. Operate the pressure tester's

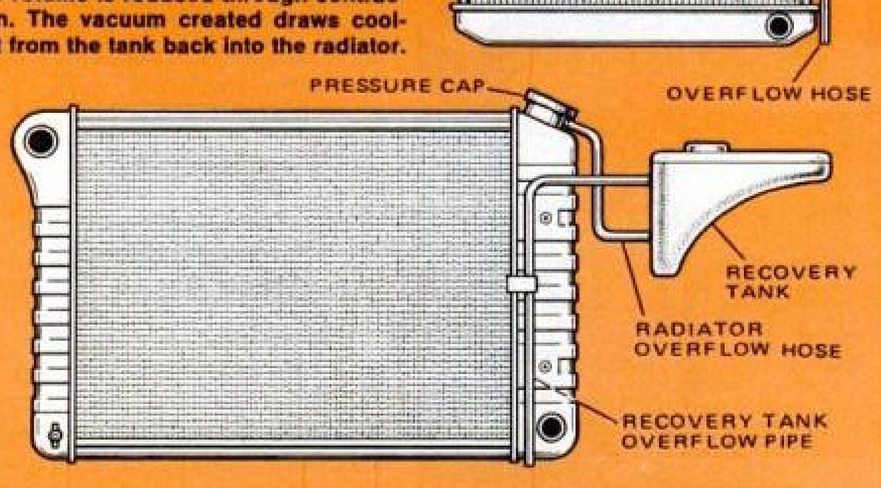
(Please turn to page 196)

OVERFLOW TUBES AND COOLANT RECOVERY SYSTEMS

Older cooling systems have a tube extending from the radiator filler neck to the atmosphere. As coolant gets hotter, it expands. If the expanded volume exceeds cooling system volum, the excess volume escapes through this overflow tube and is lost.

Radiators with coolant recovery systems, however, are now on most new cars. The radiator overflow tube connects to a tank. As coolant expands, overflow is forced into the recovery tank. Only if the recovery tank overflows is there a loss of coolant through a recovery tank overflow pipe.

As the cooling system cools, coolant volume is reduced through contraction. The vacuum created draws coolant from the tank back into the radiator.



PERTINENT SERVICE BULLETINS

The following apply to Chrysler Corp. cars:

- **SB 07-03-74, *Prevention of Repeat Conditions of Radiator Plugging, 1971-73 Models.***
- **SB 07-01-75, *Cooling System Maintenance.***
- **SB 07-02-75, *Cooling System Thermostat Interference.***
- **SB 07-08-75, *Radiator Inlet Hose Chafing, 1975 Imperial, Chrysler, Plymouth Gran Fury and Dodge Monaco.***
- **SB 07-02-77, *Engine Cooling.***

The following applies to Ford cars:

- **SB 117 (08-03-76), *Cooling Systems—Theory, Function and Problem Diagnosis.***

Материал, защищенный авторским правом

Mud room makes a grand entry

There's no need to bring the muddy mess of the outdoors inside your house. You can turn a small room, corner or wall area adjacent to the back door into a mudroom—a convenient storage place for hats, coats and outdoor gear.

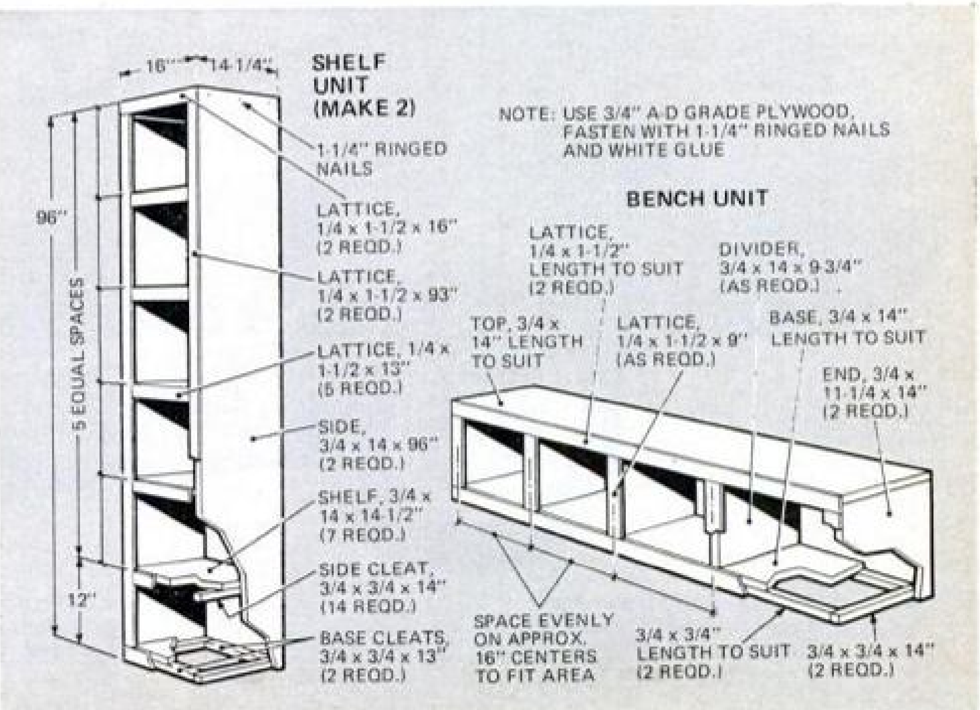
The mudroom can be a comfortable area that entices your family to stop and shed rain or snow clothes, rather than dripping through the house. It should also be a practical area requiring little maintenance, one that has plenty of storage space for all of the household's outdoor clothing and equipment.

You can build the simple shelf and bench units in this mudroom—designed by Shirley Regendahl—to provide your own family with needed storage space. The units can hold boots, skates, toys and outdoor accessories. Perforated hardboard can hold hats and coats.

Make your mudroom colorful but easy to care for by choosing durable finishes that withstand heavy foot traffic, excess moisture and outdoor elements. For example, paint the floor with floor and deck enamel and the walls with gloss or semigloss enamel, as in this mudroom which is finished with colorful Pittsburgh paints.

With a practical, welcoming mudroom, your back door may become the main entrance of your home. And the added storage and hanging space for family and guests will mean less work for you. ★★★

A good way to encourage neatness is to supply a special place for everything in an attractive, inviting room. The mudroom shown is located next to the back door, takes up minimum space, yet is equipped with easy-to-build vertical and bench storage units to help your family get organized. The units will also eliminate your picking up and hunting for misplaced items. Each member can have his own storage place, perhaps identified by his choice of color. Plans for the shelf and bench units are shown at right.



Материал, защищенный авторским правом

The same thing that made the first Mustang such a raging success—styling—quickens the pulse of many a Mustang II owner as well.

Sixty-point-three percent bought the II primarily because they fell in love with its lines.

"It's got the body beautiful," exudes a Texas store manager. "I like the snappy looks. . . ."

"The body style, the sporty design of the Mach I, and the colors were exactly what I wanted," sighs an Illinois respirator therapist.

A Florida receptionist: "I had owned a Pinto and wanted a little bigger car. I consider the Mustang II the best-looking car in its class."

While styling predominates as the Mustang II's greatest drawing card, it's not the only reason buyers give for choosing the car.

"I bought mine," writes a California social-service director, "because I owned a 1968 Mustang for nine years, put over 212,000 miles on it with the original engine, and had no problems whatever. It was the best car I've ever owned. I only hope this one does as well."

And a Michigan bowling teacher, who boasts that her family presently owns eight Fords, confesses, "I bought the Mustang II because

PM OWNERS REPORT: FORD MUSTANG II

President Carter wants us all to pitch in and save gas."

Trouble is, 21.7 percent of the owners we surveyed feel they were led down the gas-mileage path—that their cars aren't delivering the mileage promised. As we've said many times in our Owners Reports, EPA figures are *always* higher than those reported by owners.

A Virginia shipping foreman comments, "I drive 60 miles a day to work and need a car that gets good gas mileage. This Mustang II with the four-cylinder engine and four-speed gearbox is supposed to deliver 23 mpg in the city, 33 highway. I'm getting 16 and 23 mpg. Worse yet, the engine has no power and runs rough."

On the other hand, a Wisconsin teacher counters: "I'm very pleased with the 18 to 25 mpg I get with the economical V6 engine, and it's very peppy."

And an Indiana pressman tells us this about his V8-engined Mustang II: "With the 302, it's a fast car, and the Cobra II package makes it one of the best-looking on the street. People stare at the car when it goes by."

What about comfort?

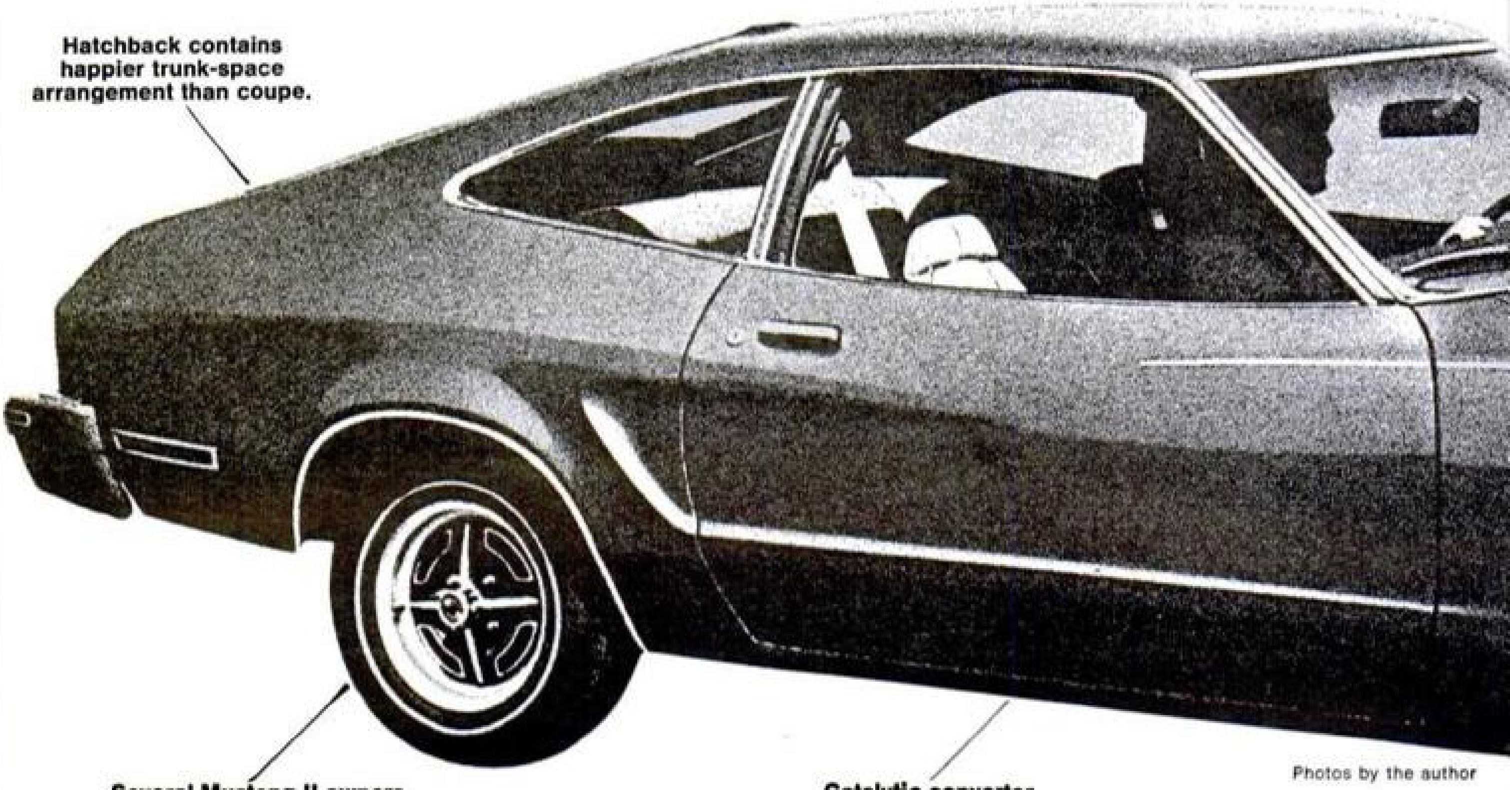
"The front seats fit well," notes a Georgia radio ad salesman, "but the rear seats are short on leg-

Despite short wheelbase (96.2 in.), the owners judge ride as good as big car.

room, as expected."

"I have to be sure my rear passengers are short and thin," quips a Texas insurance man.

BY MICHAEL LAMM WEST COAST EDITOR



Hatchback contains happier trunk-space arrangement than coupe.

Several Mustang II owners would replace 13-inch wheels with 14-inchers.

Catalytic converter critics want a return to leaded regular.

Photos by the author

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Mustang II now offers four-way manual seats with an adjustment for height.

"My Mustang II rides like a big car," opines a New York student.

An Illinois housewife: "The bucket seats are very comfortable, and there's good legroom up front. If they could get rid of the hump in the back seat a person could sit sideways, but the way it is now, with the front seats pushed all the way back there's neither headroom nor legroom in the rear.

The coupe trunk was judged too small by 8.8 percent of the owners and 11.2 said they'd like more capacity. A Georgia thermoformer sums it up by saying, "The hardtop's trunk is too small to put groceries in; I have to carry mine on the rear seat. Had I known this I would have bought the hatchback."

A Texas laborer: "We like the hatchback because our baby can lie down where the seats fold flat —like in a station wagon."

Owners of the Cobra version had a few things to say about the striping tape. For example, a North Dakota office employee: "Stripes on my Cobra II should have been painted on. They're peeling already." And a Michigan coordinator: "The Cobra tape is very poorly applied. I wash the car by hand, hoping to save some of the tape. Wrong—it's coming off anyway."

(Please turn to page 158)

When rear seatbacks are folded, the hatchback has wagon-like cargo deck.

Down-sizing pays off

The original Mustang became one of America's great trendsetters, giving rise to the ponycar rage of the 1960s. Ford sold nearly 500,000 Mustangs in its first model year. The car helped catapult its conceptual creator, Lee Iacocca, to the presidency of the Ford Motor Co.

Between 1964½ and 1973, the original Mustang V8 went from 260 cubes to 429, and the car put on 600 pounds. Meanwhile, interior space actually shrank.

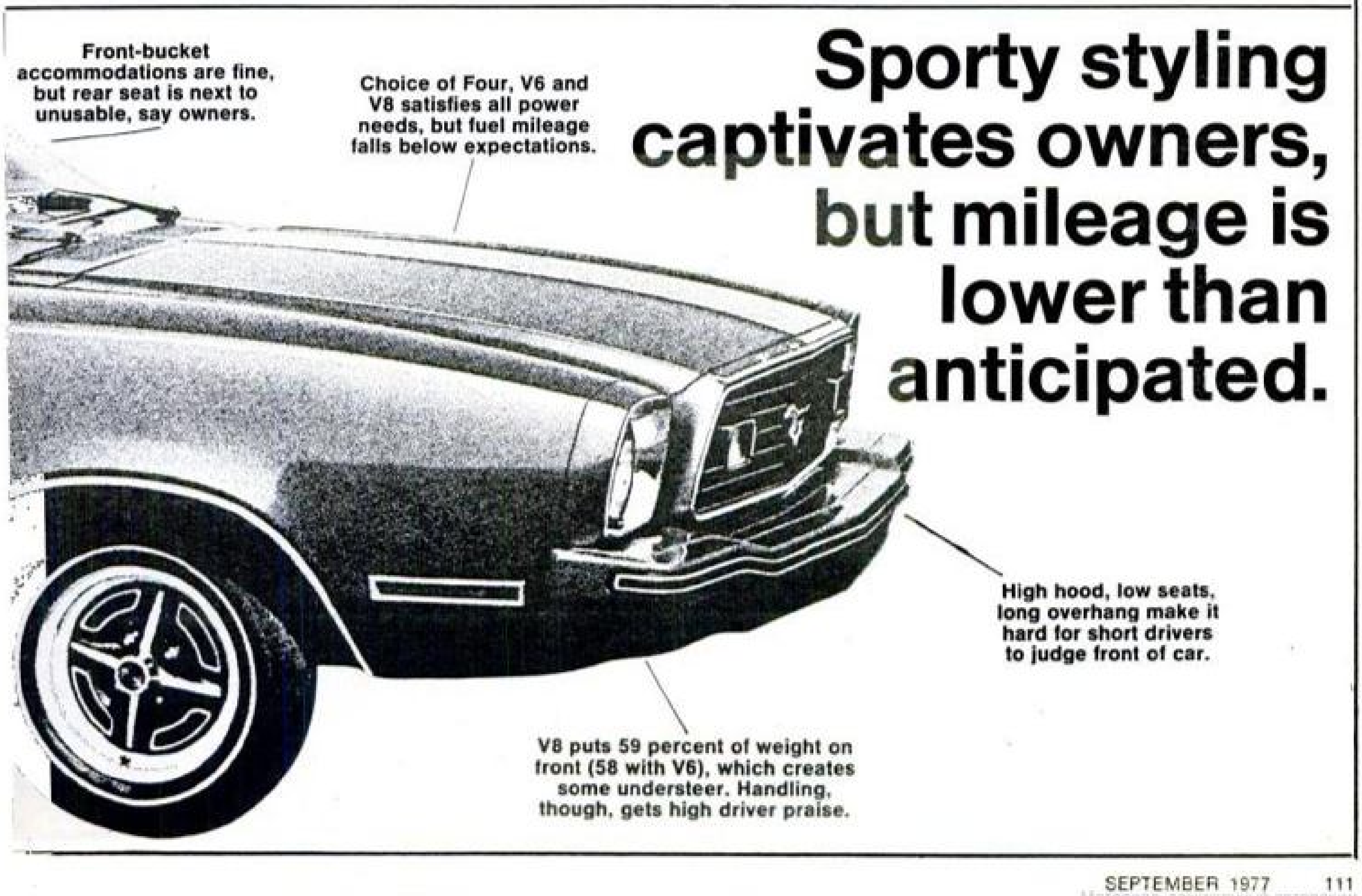
In November 1969, Iacocca and several other Ford high-ups decided the Mustang was getting too fat and powerful for its own survival. They ordered development of a much smaller, lighter, economical replacement to meet "the challenge of the 1970s."

In a daring move that meant abandoning the original Mustang, Ford introduced the Mustang II for 1974. It soon offered three engine choices: the Pinto-based ohc Four, a 2.8-liter version of the Capri V6 (actually a new block with the Capri's rods, valve gear, cam, and ignition), plus the Ford 302 V8.

Ford's decision to down-size the Mustang turned out to be the right one, because the car has sold well and is, in fact, still selling well. It's currently available in two body styles—coupe and hatchback—plus a variety of decor groups.—*M.L.*

A NATIONWIDE SURVEY BASED ON 1,180,110 OWNER-DRIVEN MILES

Sporty styling captivates owners, but mileage is lower than anticipated.

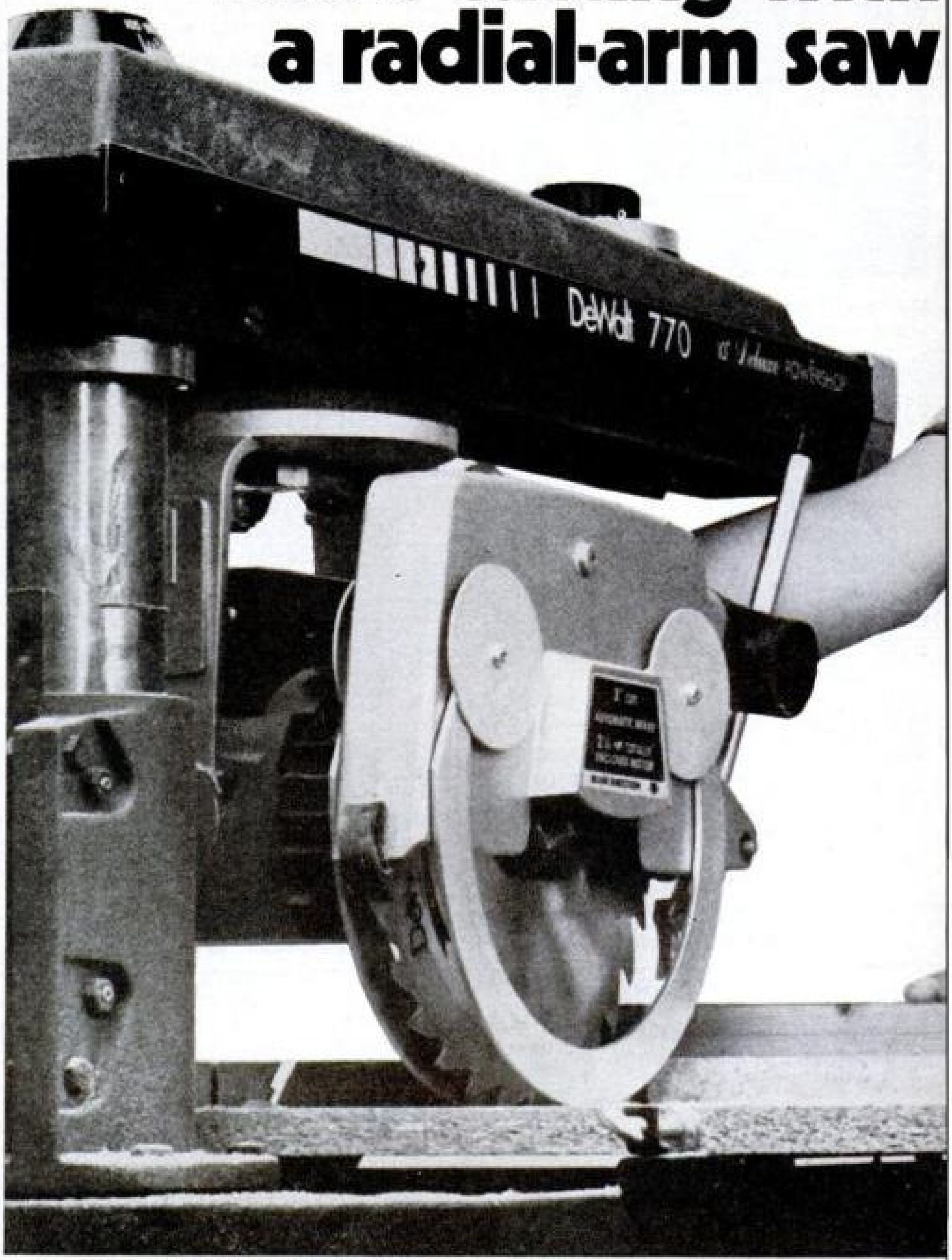


Материал, защищенный авторским правом

The cuts made most often on a radial saw are the simplest ones. Here's the right way to do them.

by Jack Marlow

Basic cutting with a radial-arm saw



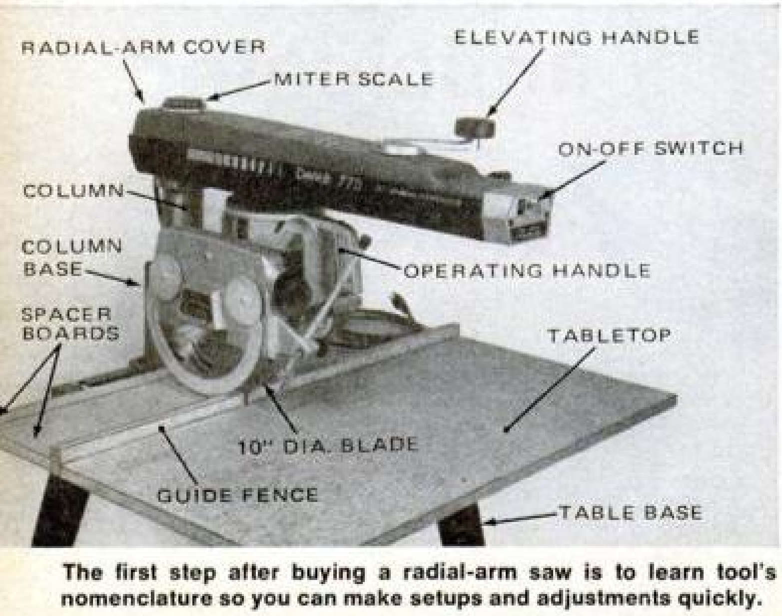
Though skilled craftsmen can perform an almost countless number of cuts and sawing tricks with a radial-arm saw, the plain and simple truth is that the cuts made most often on the radial saw are the basic ones. Since the tool is used for basic cutting about 80 percent of the time in most woodworking shops, it follows that most cutting errors—and —accidents happen when making supposedly easy cuts. Thus it's just common sense to take the time to learn the right and safe way to get the most out of your radial saw.

There are two major differences between the radial saw and the table saw. With the former the blade is above, and is moved across the workpiece to do the cutting. On a table saw the blade is beneath the work which is pushed into the revolving blade. Which saw you should buy is largely a matter of personal preference. For most of us the choice is automatic; we buy the type of saw that we learned how to use.

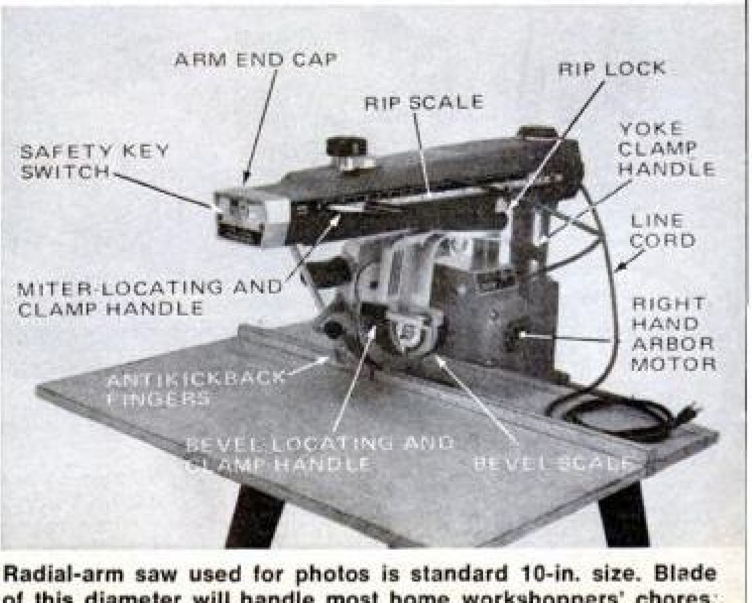
Because of its versatility, however —with attachments it can be used as a router or planer or for jointing— the radial-arm saw is frequently picked by woodworkers to be their first woodshop stationary tool purchase.

Know your radial saw

Whether you are buying or already own a radial saw, you are well advised to take the time to read thoroughly the maker's manual that



The first step after buying a radial-arm saw is to learn tool's nomenclature so you can make setups and adjustments quickly.



Radial-arm saw used for photos is standard 10-in. size. Blade of this diameter will handle most home workshoppers' chores.

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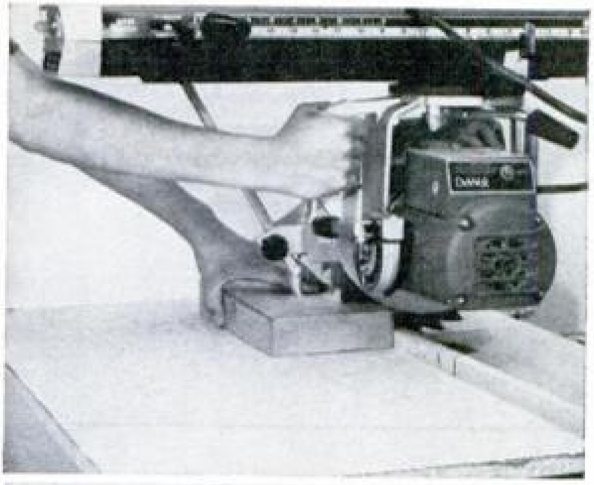
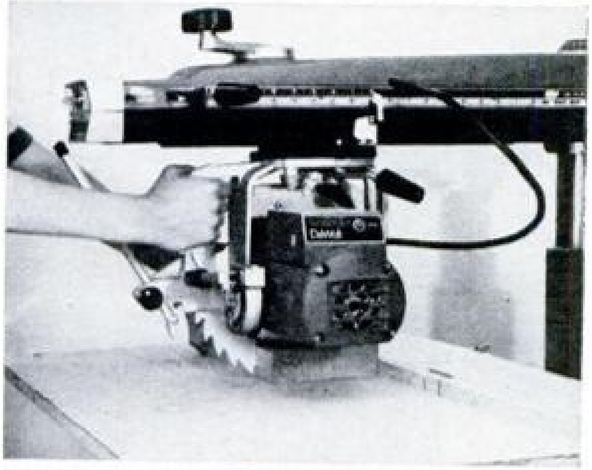
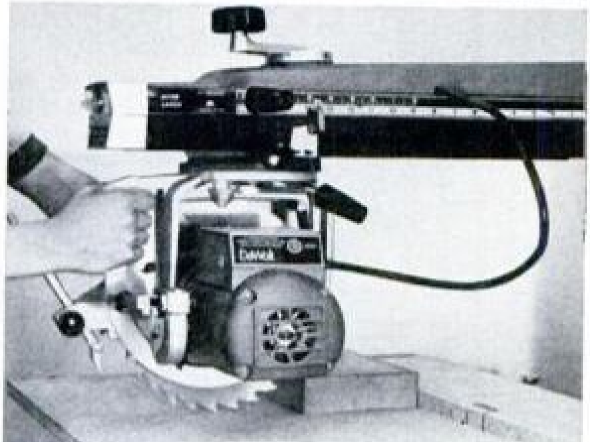


Correct way to make a safe crosscut: Four fingers of left hand are placed on the surface of the wood to be cut, thumb is tucked in under the palm. Workpiece should be held rigid against guide fence.



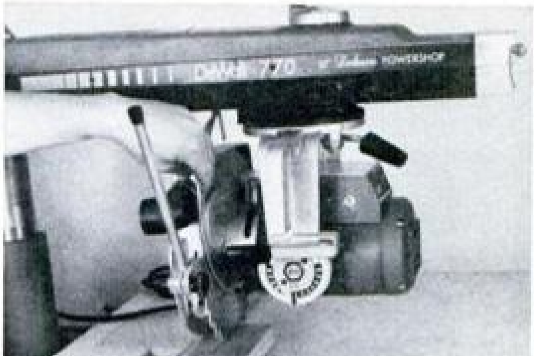
Right way to complete the cut: Saw blade is pulled forward just enough to saw through the lumber, the piece is held fast while the spinning blade is returned to its start position.

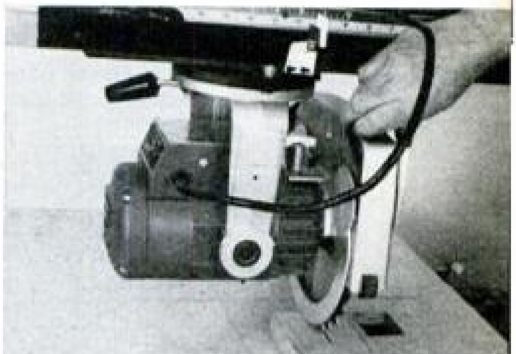


Wrong way to finish the cut: Blade has been pulled too far out from the piece just cut. On return, the spinning blade could catch cutoff (on right) and toss it toward fence or ricochet it toward operator.

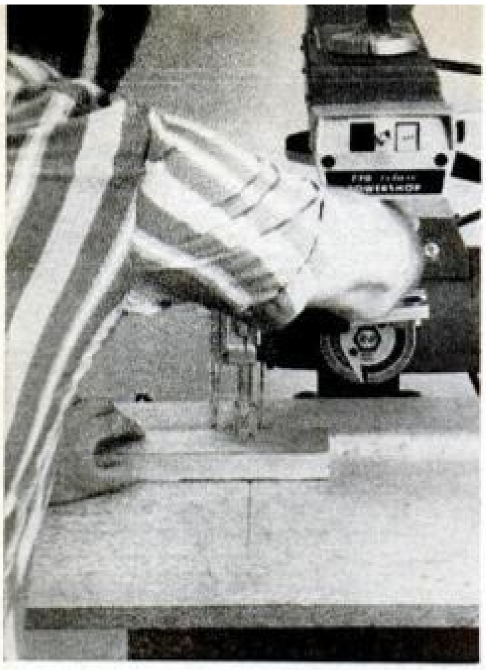
PM photos: Harry Wicks

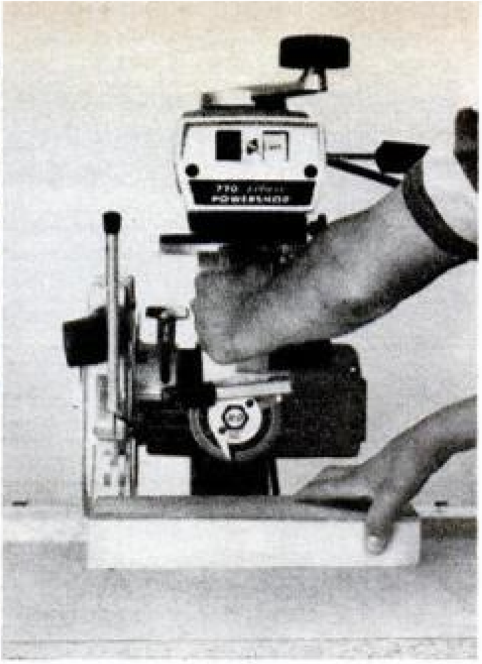
Table must be parallel to arm. To learn if it is, check arbor against top.



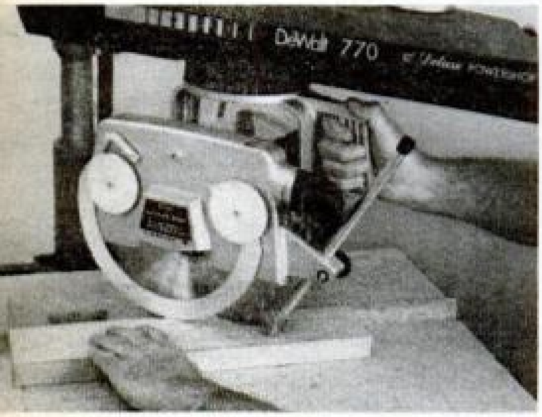


To determine if saw is parallel to guide fence, start a cut on board (left), stop saw and check the saw kerf against the blade at rear (right). Hold board against fence.

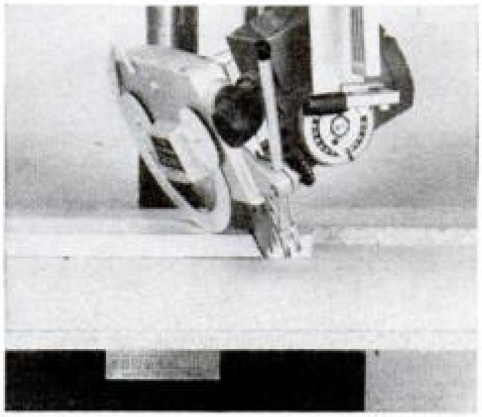




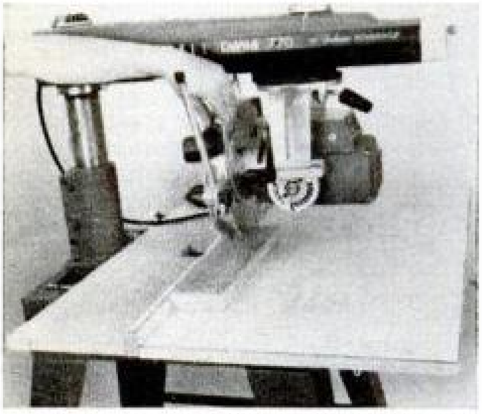
Two proper methods of crosscutting: The right-hand pull at far left is the most often used cutting technique, but the cut will frequently dictate a left-hand pull as in the photo at near left. Notice that both hands are fully visible to the operator, no matter which hand is pulling the yoke (saw). Two other important safe operating procedures for crosscutting—don't hook work-holding fingers over the fence, and make certain that blade cuts at least a 1/32-in.-depth kerf into the plywood tabletop.



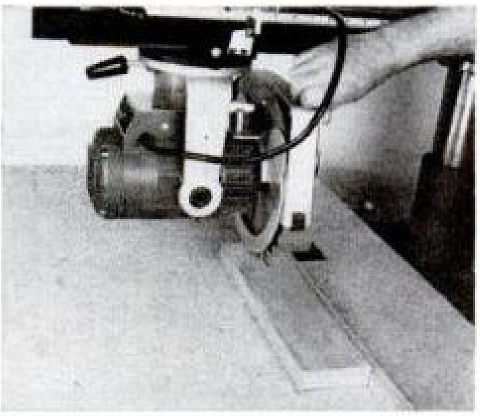
To make a 45° miter cut, the saw is turned and locked at 45° on miter scale.



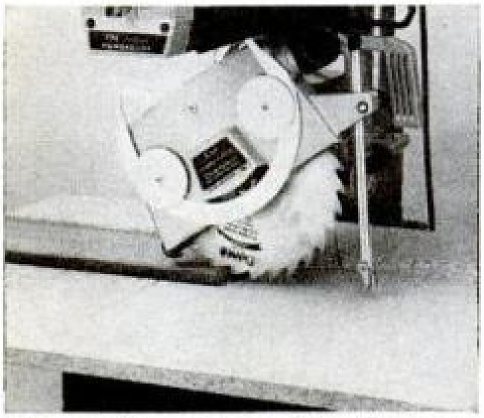
Typical compound cut: The arm is set to cut a 45° miter and saw is beveled at 30°.



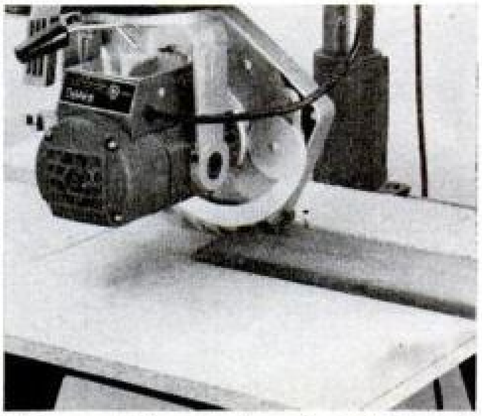
To make rip cuts, blade is turned parallel to fence, locked at desired width of cut.



For in-ripping, when the blade is between motor and post, work is fed right to left.



With saw in out-rip position, the workpiece should be fed from left to right.



Make certain guard and antikickback device are locked in position for ripping.

comes with the saw. In it, details are spelled out for adjusting and maintaining the tool. And make no mistake, it pays off in accuracy and safety to fully understand the tool with which you will do most of your cutting.

Basic alignments

An advantage the radial saw offers is accuracy. To keep the saw cutting properly you should check for accuracy periodically and make needed alignments.

It is a must that the saw's arm be perfectly parallel with the tabletop. To check whether it is, remove the blade, guard and washers from the saw and elevate the arm about 20 turns. Release the bevel lock lever and rotate the motor until the arbor points straight down (90° to the table). Next, you release the miter lock so the arm can be moved right and left. Then lower the arm until the arbor is just above the table. Move the arm over and about the top; if clearance between arbor and top is the same all over, then the arm is set parallel.

But if there is a difference, position the arbor directly over the highest point, then look below the table and locate the nearest grabnut. Swing the arbor directly over this grabnut and lower the arm until it barely touches the surface (see bottom photo, page 113). Now, without changing the arm's elevation, move the arbor over the grabnut nearest the table's lowest spot. Loosen the grabnut and push the table up until it just touches the arbor; then retighten the nut. You may have to loosen and retighten several grabnuts in order to achieve perfect parallel with the arm.

Other adjustments you should know about include making certain that the arm is at 90° to the fence,

(Please turn to page 160)

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Popular Mechanics

HOME ENERGY GUIDE

101 ways to beat high home energy costs — right now

- Heat-saving tricks that don't cost a cent
- Structural changes that will save dollars
- Manual zone-control for your home. Plus more, lots more.

What's ahead in energy-saving devices?

Solar hot-water heaters:
Fastest, cheapest way to put them to work.

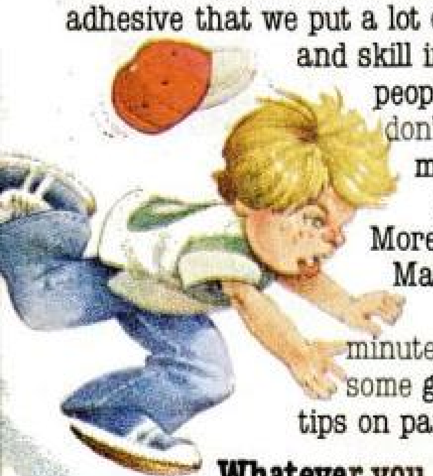
Solar energy groups you can join

Modern ways to use the oldest fuel — wood

Prepared by the editors of POPULAR MECHANICS: HARRY WICKS, Home and Shop Editor; DON MANNES, Art Director; VICTOR CHASE, RICHARD DEMPEWOLFF, STEPHEN WALTON, Contributors.

How to panel a room without climbing the walls.

HB Fuller just made paneling easier than ever. With Max Bond™ ...the new panel and construction adhesive that we put a lot of time and skill into for people who don't have much of either. More about Max Bond in a minute. First, some general tips on paneling.



Whatever you do, don't start at the beginning.

Start planning in advance of the time you begin the actual work. Figure a minimum of several hours for small rooms, more for larger rooms. Bundle the kids off to granny if need be so you'll be able to concentrate.

Do one room at a time.

If you get the urge to start in on a second room before finishing the one you're working on, lie down until the urge goes away. Get the one room done; then, no matter what happens you're finished with it.

You can measure up...and down.

To estimate how many panels you'll need, measure the length of each wall, then add the measurements together and divide the total by 4. Subtract about one-half panel for each door and a quarter of a panel for each window.

Don't put up with anything less than Max Bond.

We made Max Bond to help people like you who want to panel a room without undergoing years of vocational training to do it. Or spending hours repairing hammer dents around nails. Max Bond grabs fast and sets up quick so you'll get the job done sooner. Yet panels can be repositioned for 20-30 minutes after Max Bond is applied – so if you make a mistake you've got time to correct it. It's got excellent bridging qualities and is great for wood, polystyrene foam, urethane foam, concrete, drywall, steel, tile board, and much more. Max Bond's light tan color blends well with many shades of wood. It's also thick enough to minimize oozing down vertical surfaces – or out the end of the tube, yet it flows on smoothly and easily. Max Bond cleans up easily with mineral spirits.

How to get a free how-to booklet.

Get our free step-by-step paneling booklet when you get your Max Bond at your local home center, hardware or building supply outlet.

HB FULLER COMPANY 315 South Hicks Road • Palatine, Illinois 60067

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101 WAYS TO CUT HOME ENERGY COSTS—RIGHT NOW!

We're bombarded with blue-sky schemes for beating soaring energy bills. Here are down-to-earth things you can do right now with low-cost products, or at no cost at all.

"Thermostat: check; fireplace damper: check; radiator covers: check; lint trap . . ."

The energy crisis is hardly news, and few doubt its seriousness. It's grimly reflected every month when bills arrive. The news is full of grandiose plans for the year 2000, and entrepreneurs keep devising systems for homeowners that would cost nearly as much as the house itself—with little hope of amortizing such expense in a normal lifetime. So far, there's been little useful information about how the average homeowner can beat soaring utility and heating bills.

Are there any ways to beat the system? You bet there are! The first step is to take a look at where energy goes in a normal American home. The figures are well established. Some 70 percent goes to heat and/or to cool the house; 20 percent heats water; 10 percent runs lighting and appliances.

With that for starters, here are 101 *practical* things you can do *right now* to slash the local utility company's bite, and soaring home fuel bills, by up to half or more. Many cost nothing at all; others involve minor expense for simple projects, most of which you can build or install yourself; a few require sensible investment that will pay for itself over a few years of use. All have been tested and proven for the Federal Energy Administration (FEA) or the Energy Research and Development Administration (ERDA), by scientific laboratories in universities or in industrial labs.

THINGS TO DO WITHOUT BUILDING OR INSTALLING ANYTHING

■ Keep daytime thermostats at 65° F. in winter and (if you have central airconditioning) at 78° in summer. Both limits fall within a good health range. "People who insist they're pneumonia bait at anything below 75° in winter," say ERDA scientists, "are the same ones who cry "heat prostration" in summer if the airconditioner is set above 65°." You'll save 3 percent of fuel costs for every degree the *average* house temperature is cut.

■ Drop your 'stat to 55° when you retire in winter. The fuel bill will drop one percent for every degree dialed down at night.

■ Remove radiator covers (or use perforated tops) if your system is steam or hot water. Radiators create special convection currents in front of windows and outside walls. Covers decrease their efficiency.

■ For maximum efficiency, use flat paint on radiators and dust them regularly. Dust and metallic paints are insulators.

■ Protect your thermostat from drafts. If it's near a frequently used fireplace, move it to a more distant inside wall. Fireplace heat will keep it from triggering the furnace and distant rooms will get too cold, wasting fuel to get them back to proper temperature.

■ "Zone control" your home manually by closing off unused rooms and turning off their radiators (or shutting registers). Use self-sticking foam weatherstrip to seal such doors to prevent air exchange either way. Similar zone control can be realized with central airconditioning in summer.

■ In hot-air systems, replace the filter monthly during the heating season. A dirty filter reduces efficiency.

■ Check ductwork for leaks and tape any loose seams or joints.

■ Have your furnace serviced annually by a professional and make sure he checks—and adjusts if necessary—the burning rate.

■ Hang drapes on all windows where practical; close them at night in winter months.

■ Double-hung windows with

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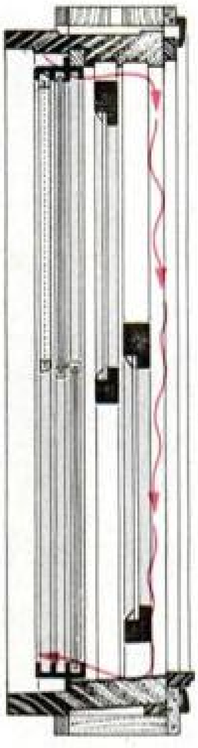
storm sash on an unshaded south wall can serve as solar collectors in the winter. Open the inside window a few inches (no more than three or four) from top and bottom. The greenhouse effect of the storm sash will warm air between the panes and set up a chimney that heats low-lying room air coming in at the bottom and sends it back through the open



Double-hung windows with storm sash on a south wall become solar heaters.

top 20° or more warmer (see diagram).

■ Turn off ventilating fans in kitchen or bath when they've done their job. They can empty a house of warm air in one hour.

Water heaters

■ Repair leaky faucets. One drop per second wastes 60 gallons of expensively heated water per week.

■ Set hot water tank at 120°—"medium" on some heaters—not the usual 140°. It will be plenty warm, and you'll cut 20 percent from the cost of hot water—which accounts for 20 percent of your total heating bill.

■ Flush sediment from the bottom of the heater tank at least yearly. A build-up will insulate water from the heat source. If you hear water gurgling when the heater's on, you have sediment.

■ Use cold water to flush away food in the sink garbage disposer. It works better than hot water; grease particles flush out and there's no buildup in pipes.

■ Home cleaning (woodwork and so forth) works as well with cold water and proper detergents.

Fireplaces

Does an open fire on the hearth add warmth to a house or suck more furnace-warmed air up the flue than it replaces? There are no simple answers. Much depends on the type of fireplace, flue-size and efficiency, controls and so on. Some researchers claim open hearth fires produce only (or mostly) radiant heat that warms bodies, not air. This may not necessarily be wholly true.

Last winter two fireplaces in a *Popular Mechanics* house were put to work to find out. With the hot-air furnace thermostat set at 65°, and an outdoor reading of 28°, a packaged fireplace in a den sent a thermometer in that room from 55° to 68° in two hours—with the room's door open. The furnace kicked in twice during that period—less than normal under the weather conditions.

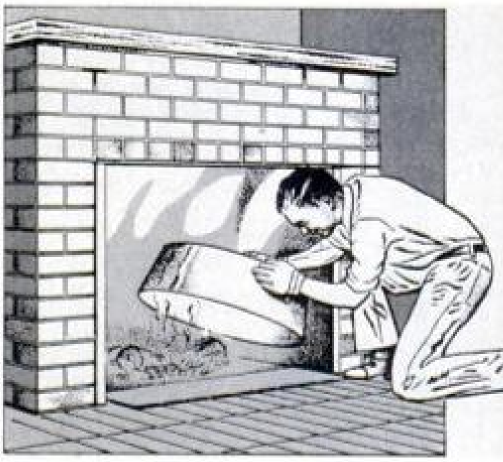
In a separate experiment, an open fire in a bigger living-room fireplace (with built-in heat vents), a room thermometer went from 55° to 73° in less than an hour in the same weather. Doors to adjacent rooms were open and the furnace never went on while the fire burned. PM's conclusion: *Some* fireplaces *do* increase ambient temperature with the furnace "on line" and, obviouslv, without a deficit of heated inside air up the flue. Until the turn of the century, that's how most country homes were heated.

Add-on fireplace devices will increase fireplace efficiency and sensible fireplace practices can help! (above right)

■ With a fireplace going, keep doors to other rooms closed—or keep the furnace turned off until you need it.

■ If the thermostat faces a frequently used fireplace, or is close by, move it to the far end of an inside side wall or to another room with no alternate heat source.

■ Keep the fireplace damper closed when no fire is burning. An open flue from a 48-inch-square fireplace opening will remove 8 percent of furnace-warmed air from the house continually.



Snuff fireplace embers (not a blaze) with a large kettle and close damper.

■ Fasten a metal handle to the bottom of a five-gallon enamel canning pot and (wearing an asbestos glove) use it as a snuffer (see sketch) to extinguish a live-embers (not blazing) fire when you leave the fireplace. *Be sure all live coals* are extinguished before you close the damper.

Airconditioning

■ Set your thermostat at 78°, which can be comfortable if you dress lightly. If your usual setting was 72° you'll save between 12 and 14 percent (depending on your area) of the annual bill for cooling.

■ Don't set the thermostat colder "to get it started" on the theory that it will cool the room sooner. It won't.

■ Change your airconditioner's filter monthly during the cooling season. Dirt slows movement of cool air into the house.

■ Keep the airconditioner's fan on "high" except in humid weather. The compressor works just as hard whether the fan is high or low. On high, more cooled air is brought into the house and the compressor will shut itself off sooner.

■ Spread cooled air around your room with a small portable fan. It keeps the cooled air from "layering" and settling to the floor.

■ Turn off a room airconditioner when you leave the room. You'll use less current bringing the temperature down again when you return than if you left it running.

■ Don't locate lamps, TV or radio near enough to affect the airconditioner's thermostatic control, which is highly sensitive.

■ Keep direct sunlight from entering an airconditioned room. This is readily achieved by draw-

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ing drapes and closing blinds or shades. Such simple measures can reduce the sun's heat input into a room by up to 80 percent.

■ Keep windows and outside doors shut when temperature outside is higher than inside.

■ If you use storm windows in winter, leave them up in summer. The double glass has an insulating effect that can cut heat infiltration by more than half.

■ Keep lights off whenever possible while the airconditioner is running, and use lamps with as low wattage as possible when you need light. Incandescent lamps add considerable heat for the airconditioner to get rid of.

■ Do all cooking and baking possible in early morning and late evening during hot weather.

Lighting

■ "Light zone" your house to provide good illumination for reading, writing, sewing or sketching, with wattage as low as possible elsewhere. Wattage saved in this simple manner can add up to almost three figures in a year.

■ Use one large bulb in preference to three smaller ones where bright light is needed. A 100-watt lamp will provide better reading light than three 40-watt bulbs.

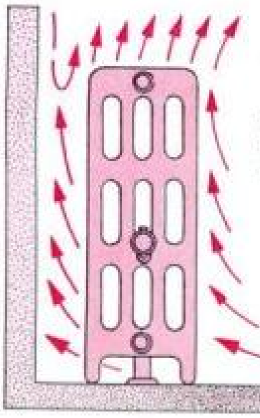
■ "Long life" incandescents use more energy than standard bulbs. Enough said.

■ Turn off all but one or two low-watt lamps when watching TV. You only need enough light to balance TV brightness and avoid eyestrain.

■ Specify 4-watt clear night-light bulbs. They use half the energy of the 7-watters and provide almost the same light.

■ Keep all bulbs and shades clean. Dirt absorbs light.

■ Use outdoor spots, floods and driveway illumination only when necessary.



Remove radiator covers to let heat convection function more naturally and efficiently.

■ Use fluorescent bulbs whenever possible. A 40-watt fluorescent will use 140 watts less than a 60-watt incandescent in a seven-hour period—and provide more than five times the amount of light.

Kitchen

■ Never boil water in an open pan. It boils sooner and over less heat in a covered vessel. Once boiling, keep it rolling with as low a flame as possible. Unpressurized boiling water gets little hotter, no matter how high the flame.

■ Kept clean, range-top burners and reflectors produce more heat with less energy.

■ Don't put small pans on large heating elements or (on gas stoves) let flame exceed diameter of the pan. Heat missing the pot bottom is lost to the air.

Unplug the coffee warmer and use Thermos bottle to keep the coffee hot.

■ Turn off heating elements of electric stoves shortly before cooking time is up. They'll stay hot long enough to finish the job without using more electricity.

■ Don't open the oven door to "peek and poke." It wastes heat. Use a timer for baking and roasting.

■ Small electric fry pans and grills use less energy than a range or oven for small meals. A toaster uses less power than the oven or grill for family toast.

■ Keep the refrigerator food compartment at 40°; freezer compartment at 5°. A thermometer will give you the proper setting for the unit's dial control.

■ Manual-defrost refrigerators and freezers should be defrosted regularly. More than a ¼-inch buildup of frost puts an extra load on the compressor motor.

■ Check seals on refrigerator and freezer doors. If you can slip a piece of paper under them anywhere, have them replaced.

■ Don't wash dishes under hot running water or you'll be throwing away gallons of costly heated water. Close the drain, fill the sink with warm water and detergent, and rinse with a hot spray in the dish drainer.

■ Never run your dishwasher until it has a full load.

■ If your washer has no "air-dry" switch, turn the control to "off" position after the last rinse, crack the door and let the dishes air-dry by themselves. You'll save a third of the energy cost of automatic dishwashing.

■ The "rinse-hold" control on dishwashers uses three to seven gallons of hot water each time used. Avoid using it.

Laundry

■ Don't wash partial loads. Wait until you can fill the machine—unless it has a "small load" attachment.

■ Always presoak badly soiled clothes, or use the soak cycle to avoid having to run a wash twice.

■ Clothes can be cleaned successfully in warm water rather than "hot" water, and can be rinsed well in cold water. You'll save half the demand on the water heater with these easy steps.

■ Don't let lint build up in the dryer's collector screen. It blocks airflow and takes more time and heat to do the job.

■ Don't forget the old-fashioned clothesline. Outdoors in fine weather clothes get a fresh sunshine smell. On bad winter days, hang them in a basement area warmed by the furnace. That dryer—gas or electric—uses a phenomenal amount of energy.

■ Dry heavy and lightweight laundry separately if there's enough wash for two loads. Light clothes dry faster, use less energy. They may even dry with residual heat left from the first batch.

Bathroom

■ Try five-minute showers instead of 30-minute tub baths. You'll use 25 percent less hot water. In a year it can amount to nearly $50 for a family of four in water heating cost.

■ Don't scrub nails or wash hands under a running stream. Fill sink for washing and rinsing. You'll use half as much heated water.

INSULATION

The FEA estimates that some 40 million single-family homes in this country are inadequately insulated. By bringing them up to par, the heating and cooling load for each home could be reduced by 20 to 30 percent. That means that if your home heating bill runs to $400, a $300 investment in insulation could pay for itself in three to five years.

Check where and how much insulation your house may need. Local building materials dealers can

(Please turn to page 123)

Attic calls for R-30 insulation (see chart). Add more to bring it up.

TYPE OF INSULATION

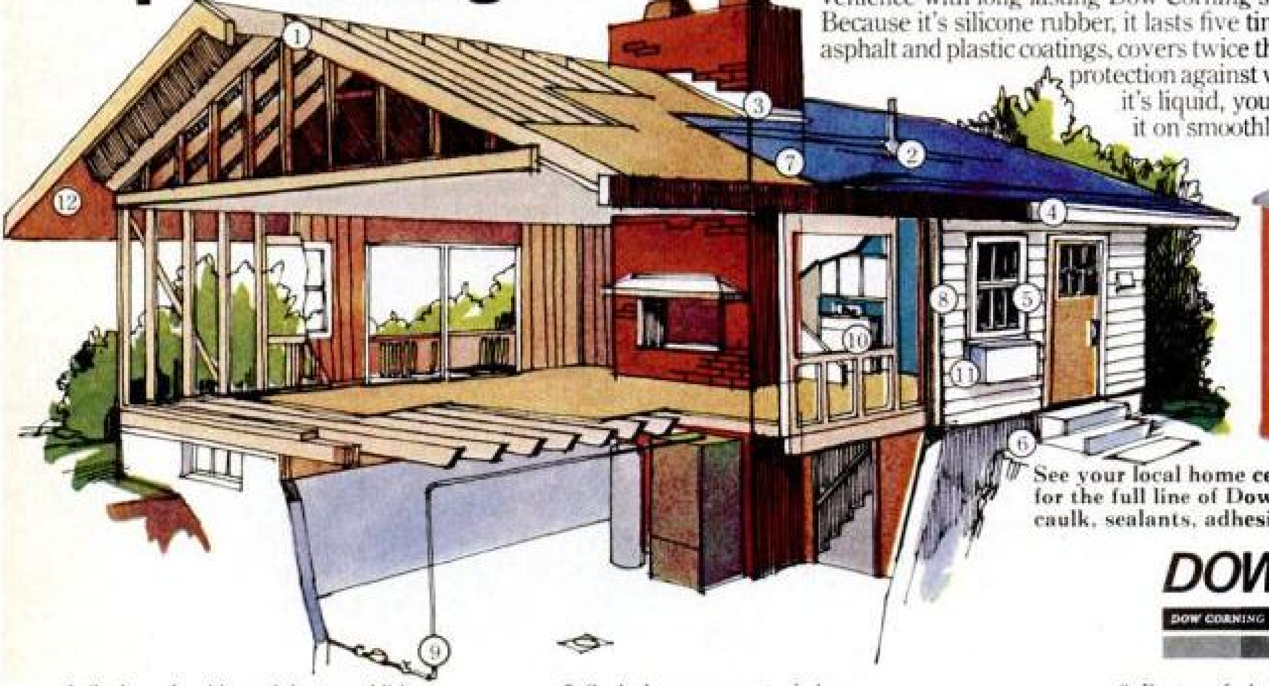
R-VALUE	STANDARD WOOD FRAME WALL UN-INSULATED	REFLECTIVE SHEET	BLANKET OR BATTS		LOOSE (POURED IN)			FOAMED** PLASTICS (RIGID PANEL OR FOAM IN PLACE)		EXPANDED** MINERALS LOOSE
		SHEET	GLASS FIBER	ROCK WOOL	GLASS FIBER	ROCK WOOL	CELLULOSE FIBER	POLY-STYRENE	POLY-URETHANE	VERMICULITE OR PERLITE GRANULES
UP TO R-3		1 SIDE	1"	1"						1"
R-4		2 SIDES						1"		
R-6	*								1"	
R-11			3½"	3"	5"	4"	3"			
R-19			6"	5¼"	8"	6"	5"			
R-22			6½"	6"	10"	8"	6"			
R-30			9½"	9"	13"	11"	8"			
R-38			12"	10½"	17"	14"	11"			

*AVERAGE WALL OF 2X4 STUDS, ½" PLYWOOD SHEATHING, ¾" CLAPBOARD SIDING, 15-LB. FELT VAPOR BARRIER, ½" PLASTERBOARD

**R-VALUE IS CALCULATED PER INCH OF MATERIAL USED

Introducing Dow Corning® silicone rubber coating. The roof-to-basement brush-on maintenance/repair coating.

Get versatile silicone rubber performance with brush-on convenience with long-lasting Dow Corning silicone rubber coating. Because it's silicone rubber, it lasts five times longer than most asphalt and plastic coatings, covers twice the area, and offers lasting protection against weathering. And because it's liquid, you can brush, roll, or spray it on smoothly and easily.



See your local home center or hardware store for the full line of Dow Corning silicone rubber caulk, sealants, adhesives, and coating.

DOW CORNING

1. Seals roof, gable, and dormer additions.
2. Seals roof vents, air ducts, skylights, and eaves.
3. Seals flashings and chimney caps.
4. Seals gutters, troughs, roof valleys.
5. Seals door, casement windows.
6. Patches and repairs masonry, cement, concrete block.
7. Patches and repairs loose shingles.
8. Patches and repairs wood and aluminum siding.
9. Rustproofs drains, plumbing joints.
10. Rustproofs underside of sinks, dishwashers.
11. Weatherproofs air conditioner covers.
12. Rotproofs wood.

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EDMUND SCIENTIFIC
ENERGY-SAVING VALUES

SEE SOLAR ENERGY IN ACTION

Convert light into actual kinetic energy with this fascinating solar-powered, electric demonstrator. Interesting curio for desk or window-sill. Silicon cells powering the propeller are the same found in large solar panels. Spins whenever sun shines! Plastic cube.
No. 42,287 .... **$23.95** Ppd.

FLYWHEEL GENERATOR FLASHLIGHT

Never needs batteries, uses a flywheel generator to keep light bright. Each squeeze of handle gives 2 sec. flash of light. Continuous squeezing keeps light shining. Only 6-oz.
No. 61,086 .... **$14.95** Ppd.

Free Catalog

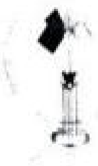
LOW COST SOLAR WATER PANEL

- Delivers up to 1000 BTU/Hr.

Perfect way to start your conversion to solar power. Lightweight, high quality panel for demonstrations, experimentations or system use. Combine them in an array to build a solar water-heating system. Only 30x30x5" this pre-formed, closed cell panel has a urethane base, special U.V. inhibitor and water flow channels.
No. 80,259 .... **$47.50** Ppd.

HAVE A SOLAR BARBECUE!

Portable solar cooker comes complete with skewer, solar foil, adj. stand—even solar recipes. No mess, smoke, fuel or flame... just add sunshine. Cooks in 10-15 min. Weighs less than 1-lb. 40 foil sheets incl.
No. 71,653 .... Ppd. **$14.95**



CROOKE'S RADIOMETER powered by sunlight

Fascinating solar rotor spins at 3,000 RPM. First-surface silvering on ½ dome makes hemispherical mirror. 5x3"
No. 60,529 ... **$5.75** Ppd.

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DO-IT-YOURSELF SOLAR EXPERIMENTER'S KIT

Created by Bell Labs, this kit incl. everything you need to turn silicon wafers into working solar cells. You get 94 pg. bk., chems., wire, solder, forceps, silicon, coil, more.
No. 71,906 ..... Ppd. **$24.25**

DELUXE SOLAR CELL INVESTIGATION KIT

Discover the many applications of solar energy. Kit has 3 hi-powered cells; wires, motor, and 96 pg. bk. of experiments.
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Save wasted heat from your stove, furnace, or boiler pipe. Slip the 16 heat-exchanger fins over a metal flue pipe (no tools req.). Heat normally lost is now captured.
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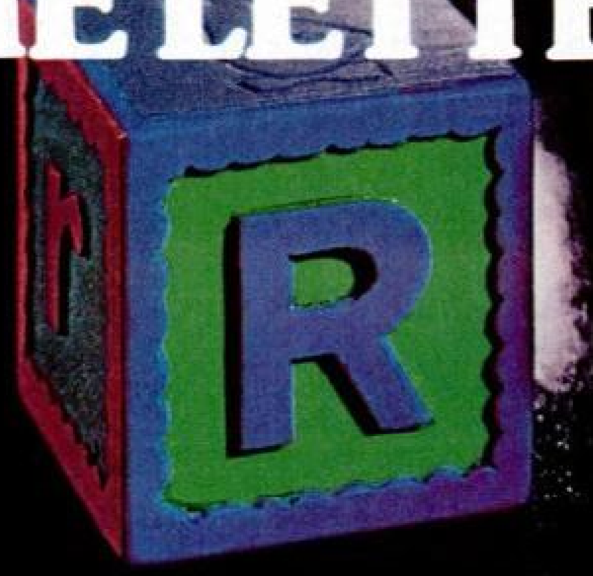
THE ABC'S OF INSULATION START WITH THE LETTER



When you investigate insulation for your home, start by comparing R values. They're the standard means of measuring insulation's effectiveness per inch of thickness. A product's R value expresses its ability to resist the natural tendency of hot air to flow toward cold surfaces. A poorly insulated home lets in unwanted heat in summer and loses expensive heat in winter.

Insulspray® foam insulation, a patented new product from Borden, has an R value of 4.3 per inch. By comparison, fiberglass has an R value of 3.3 per inch.

In a typical house with a 3½" sidewall, Insulspray will provide an R factor of 15, fiberglass batts 11. This means Insulspray offers 36% more thermal resistance. Check from A to Z, and you won't find an insulation product for your walls with a higher R value than Insulspray.

"R" stands for results, too. Insulspray foam insulation fills the space within the outside walls of your house, where much heat can be lost. So Insulspray helps hold down both heating and air conditioning bills and makes your home quieter.

Another R to remember is reliability. Insulspray foam insulation is available only through trained, authorized Insulspray contractors. And it's produced by the Chemical Division of Borden, a name you know and trust.

Look at it this way. A, we need to conserve energy. B, you want to hold down fuel bills. And C, you should get the best performance for your insulation investment.

Note: R value is 4.3 at 72 degrees F, and 4.8 at 32 degrees F.

For high R value, results and reliability, investigate Insulspray foam insulation for your home.

FREE! WRITE TODAY FOR A MONEYSAVING FREE BOOKLET
with 50 suggestions for reducing your home energy requirements, plus the full story of Insulspray.

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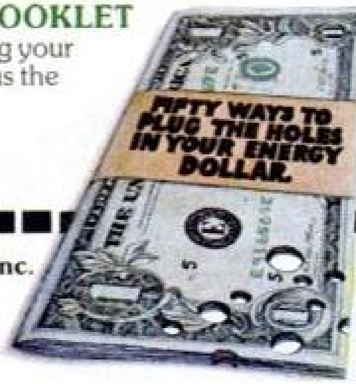

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Insulspray Department
P.O. Box 701,
Medina, Ohio 44256
Please send free booklet to:

Name

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PS

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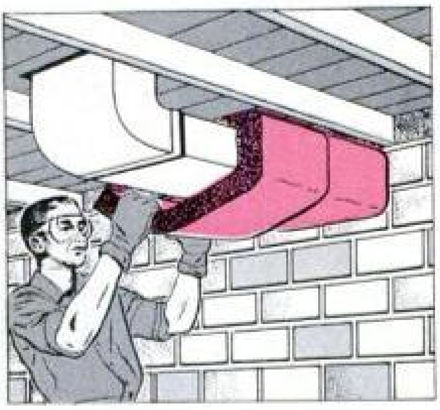
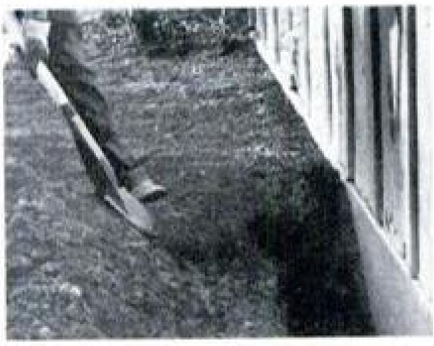
provide the insulation "R-values" recommended for your area. The "R" stands for resistance to heat loss (or heat gain, in summer). The amount of resistance provided by the thickness of any particular insulating material is expressed by a number; the higher the number, the higher the insulating, or



In cold basements or crawl spaces special blanket-type insulation should be used to wrap metal ducting as shown at left. In heated basements, or in areas where water pipes may freeze, don't wrap the ducts.

Blanket-type insulation is used as shown in basements and crawl spaces, with a strip against the header joist between floor and sill, and strips cleated to the sill and draped down the wall.

Hot-air duct tape, a product of companies like 3M, is used to seal every seam and gap in metal work. Installers frequently miss a lot of places.

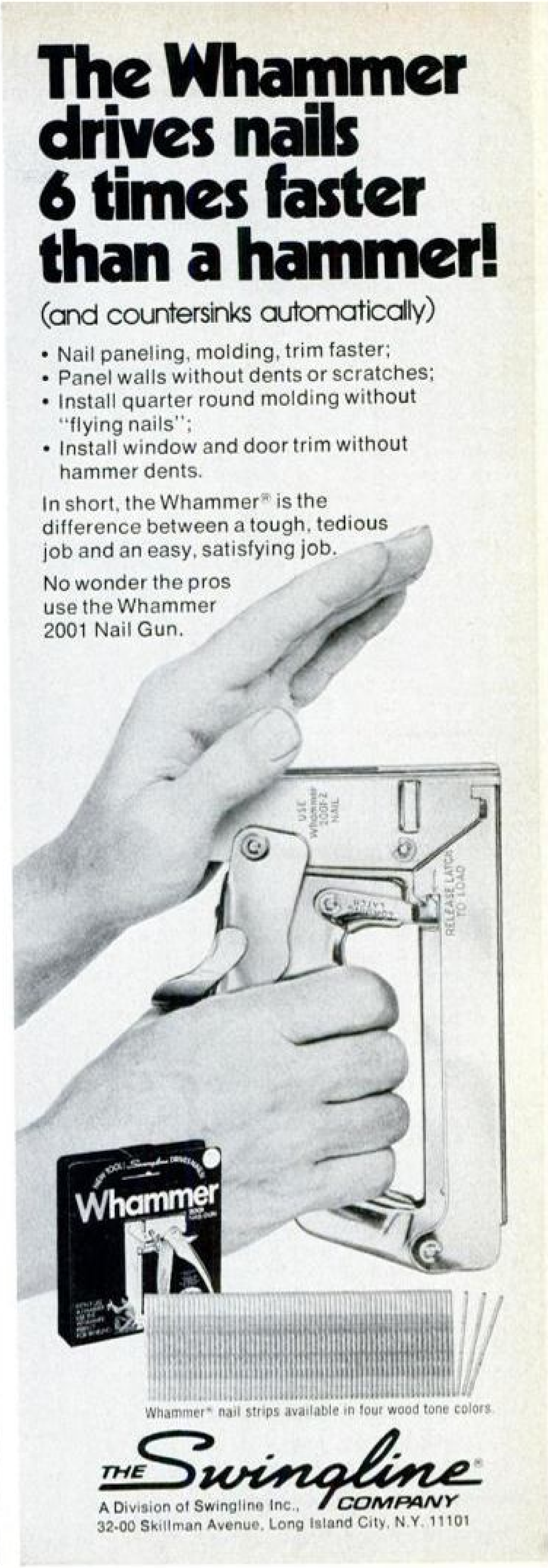


Foundation walls can be insulated outside. Wall is exposed to frost line, then covered with insulation such as Dow's Styrofoam panels; hole is then backfilled.

resistance, value. All building materials have *some* insulating value, including walls with no insulation at all. But such R-values are quite low (see the chart on page 120 for the thickness required in different types of insulation to produce a given R-value).

■ Check attic insulation, where most heat loss occurs in a house. ERDA recommends R-30 (9 to 10

(Please turn to page 124)



inches of batts or blanket type). It's best installed between ceiling joists, and can be layered if you already have some but not enough. It can cut 5 percent from your heating bill if you add 3 or 4 inches to bring it up; up to 30 percent if you're starting from scratch.

■ As for walls, ERDA tests show that electrical gear, braces and firestops block blown-in insulation, leaving huge voids, and that blow-in and foaming types are too expensive for dollar payback in a reasonable time. It will cut some heat loss if you retrofit exterior walls. If you do, R-11 to 13 is recommended. Be sure to have the installer put vents in the wall for moisture control. Insulated walls can save you 16 to 20 percent in heating costs.

■ Insulate basement or crawl-space walls—it's worth a 5 to 25-percent saving, depending on weather-tightness of your home's underpinnings, and will also protect water pipes against frost. This can be done outside by digging trenches and laying in one-inch foam panels, as shown, against the exterior side of the basement or crawl-space wall, or on the wall's interior side with blanket-type insulation (see sketch). While the foams have a much higher R-value per inch of thickness, they are not often used inside due to the combustible properties of most. Urethanes are very flammable. Ureas are less so, but their insulating value drops somewhat with time.

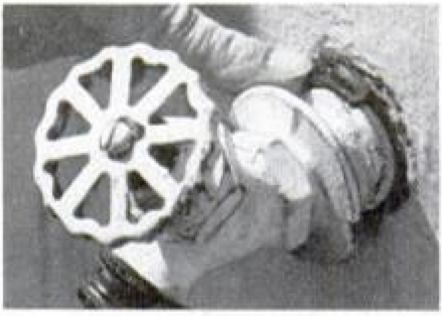
■ Insulate ducts and pipes. Long runs of sheet-metal ducting and hot-water pipe can lose more heat on the way to destinations than they deliver there. Special two-inch blanket-type insulation is made for ductwork; asbestos sleeve sections are available for all water-pipe diameters. Together, they can cut from 5 to 10 percent of your yearly heating bill.

■ Insulating a water heater can save another 5 to 12 percent in heating cost. Johns-Manville puts out special blanket kits for electric or gas-type heaters. Keep all gas-heater vents exposed.

CAULKING AND WEATHERSTRIPPING

Up to 70 percent of heat loss in poorly built homes can be due to

New type of seal that is foamed in place, above, insulates the spaces it fills; requires a pressure gun.



A quick and easy Seal Patch can be pressed in place at wall openings.

infiltration of outside air through window and door frames. Caulking and weatherstripping materials for an average three-bedroom home may cost as little as $25. Savings in costs for heat can run to 10 percent or more per year.

■ Run a lighted candle around the inside of all window and door frames. If the flame dances, you need caulking. If it leans away from window sash edges, and if you can slide heavy paper under the door, you need weatherstripping.

All joints where two different materials, or sections of the house, meet should be caulked.

■ Caulk along window and door tops between the drip caps and siding . . .

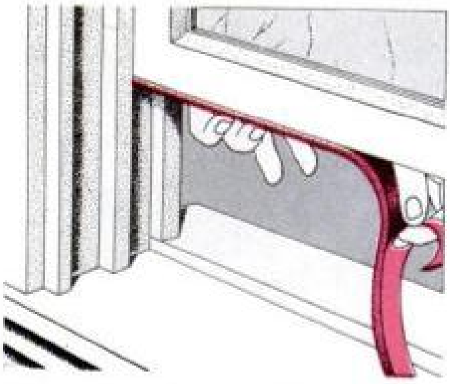
■ Caulk along the joints between window and door frames and siding . . .

■ Caulk along the underside of windowsills where they butt the siding . . .

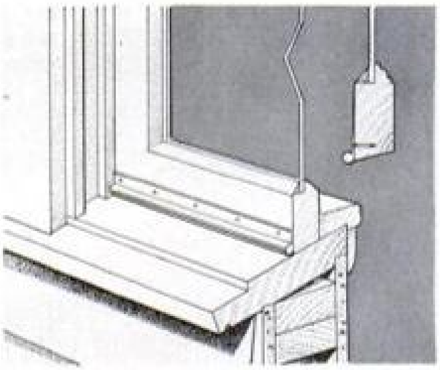
■ Caulk all inside and outside corner joints that are formed by the siding . . .

■ Caulk along the underside of the siding, where it laps the foundation wall . . .

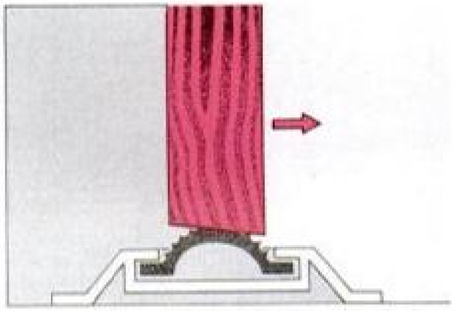
■ Caulk around hose bibs and other outside wall penetrations by



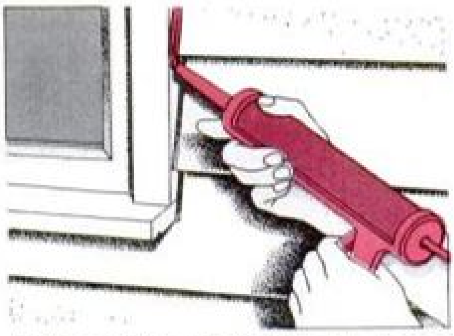
Self-sticking foam rubber weather-strip installs easily; wears out fast.



Rolled vinyl strip is tough, easy to install, but is highly visible.



Vinyl bulb threshold for exterior doors is efficient and replaceable.



Tube caulking applied by gun does a quick job at all exterior joints.

pipes, electrical service conduits, dryer vents, ventilator housings and so forth. (A new Seal-Patch made by the Duro Div. of Woodhill can be pressed in place for a tight, instant seal on the sort of small openings described) . . .

■ Caulk where pipes and wires

(Please turn to page 126)

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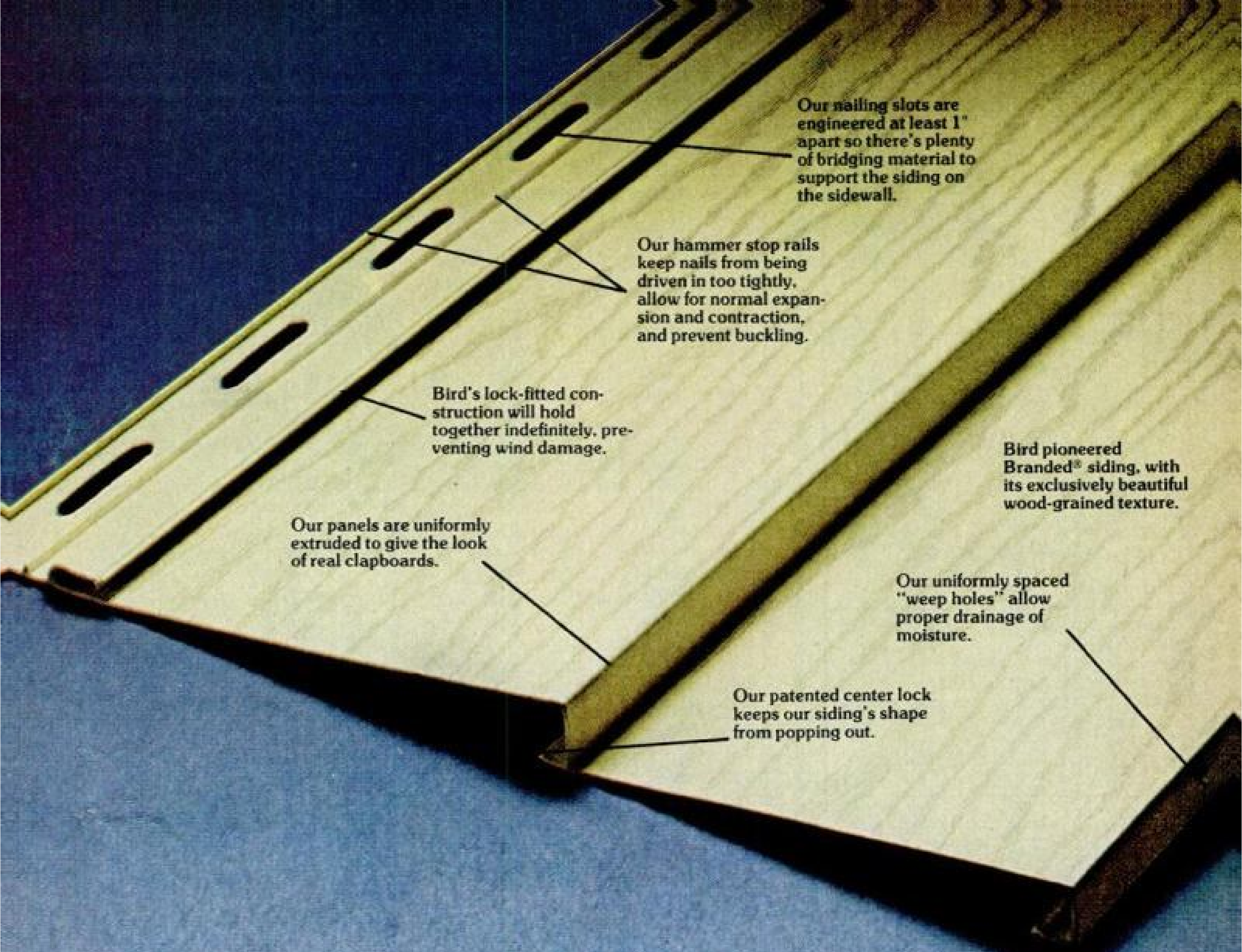


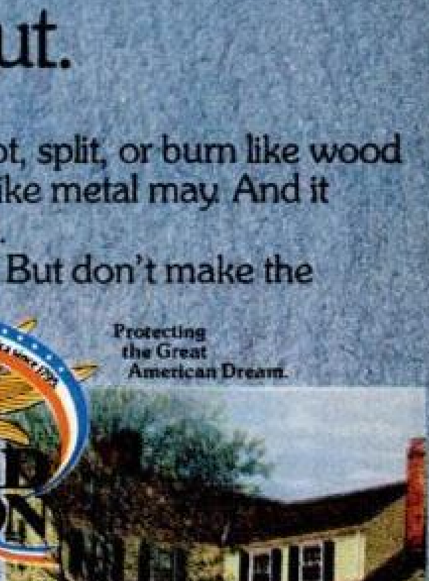
The side of solid vinyl our competition won't talk about.

Buying solid vinyl siding is a wise decision. It can't rot, split, or burn like wood may. It can't corrode, rust, attract lightning or spoil TV reception like metal may. And it will never need paint, because the color goes all the way through.

Any solid vinyl siding manufacturer will tell you this. But don't make the mistake of thinking all solid vinyl siding is the same. Bird's construction is so unique, it's patented. So don't buy a thing until you look for the hidden differences we've shown you. And if you find that some people won't talk about them, come talk to us.

Protecting the Great American Dream.

BIRD & SON



Bird & Son, inc., E. Walpole, MA 02032

Please send me your idea-packed booklet, "What you should know about roofing and siding before you build or remodel." I enclose 50¢ in payment. I am planning to: ☐ build ☐ remodel

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Please include facts on ☐ Solid vinyl Gutter Systems ☐ Ornamental Shutters ☐ Asphalt Roofing

Popular Mechanics—Sept. 1977

More Warmth from less Wood

The airtight, all cast-iron REGINALD 101 woodburning stove will heat 1-2 rooms and burns all night long on one load of hardwood. Comes in easy-to-assemble kit form, **so you save at least $50** off similar Scandinavian-type box stoves. Write for FREE details and wood heat information telling all about this super-efficient stove, along with the new, bigger Reginald 102 and Reginald cookstove.

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Send FREE Information about the REGINALD 101 Wood Stove and other models that **pay for themselves** in fuel-energy savings.

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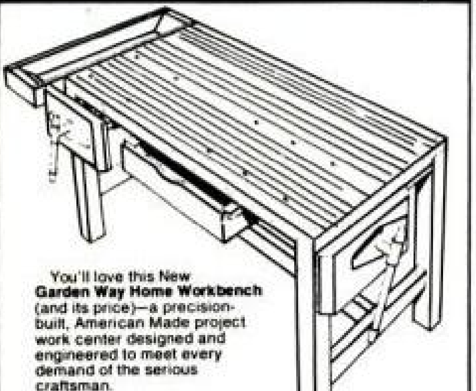
If You Love Your Workshop.



You'll love this New **Garden Way Home Workbench** (and its price)—a precision-built, American Made project work center designed and engineered to meet every demand of the serious craftsman.

Made entirely of solid Vermont maple, this extremely versatile bench offers you a massive multi-laminated, 2 inch thick 12½ sq. ft. (30x60) work surface. Bench comes with 2 extra large capacity vises with patented double-position design. Has a unique metal-to-metal fastening system which will hold bench rigid over years of hard use, yet can be disassembled in 15 minutes should you ever need to move it.

Options include extra large capacity tool well and tool drawer.

Please clip and mail now!

TO: Garden Way Research Dept. 70199W
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Please send me your FREE CATALOG all about the New Garden Way Home Workbench, including details on your easy-to-build kits.

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penetrate ceilings from an unheated attic . . .

■ Caulk along joints where chimney and other masonry meet siding . . .

■ Caulk along joints where the porch decks and roofs meet the siding . . .

■ Caulk along joints where the gable ends meet the roof eaves.

■ Check all window panes and apply glazing compound where old putty has hardened and cracked or broken off.

■ Weatherstrip all outside windows and doors. Cheapest and easiest to install is the self-sticking foam strip, but it should be replaced every couple of years. It won't stand up, either, along the sides of double-hung windows where friction of raising and lowering the sash induces heavy wear. Rolled vinyl stops are readily tacked in place by do-it-yourselfers for a longer-lasting seal. Spring metal makes a snug, durable seal, but calls for precise placement and handling. Metal J-stripping is the best of all, but requires removal of doors and windows and highly critical alignment; it's really a job for a professional.

■ Install sealed thresholds under outside doors. "Sweep" types are easily tacked in place on the outside surface of the door bottom by anyone who can swing a hammer, but may wear the carpet where they rub across it when you open and close the door. Vinyl bulb types are better, but tougher to install; interlocking metal units are excellent, but need critical alignment. The latter two types require removal of the door and refitting its bottom.

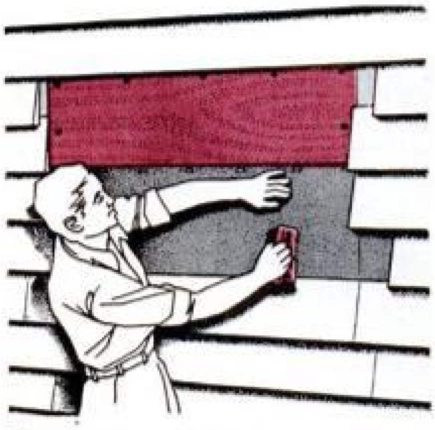
■ Weatherstrip the attic door if you have one, or icy air from up there will pour down in a continuous stream to chill expensively warmed rooms below.

QUICK AND EASY RENOVATIONS

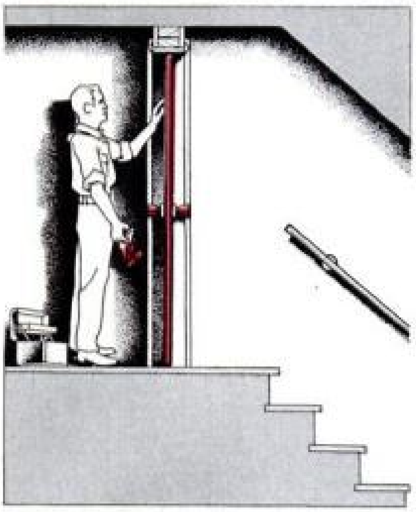
■ Install a doorway at the top of your stairway, and keep it closed in winter. It will prevent warm air from rising to the bedrooms (where less is needed), and cooled air upstairs from cascading down the stairwell into the living areas.

■ Build a false dropped ceiling in the stairwell (see sketch) to prevent the warm air in downstairs rooms from collecting in the "heat trap" against the stairwell's two-story-high ceiling—where it does no one any good.

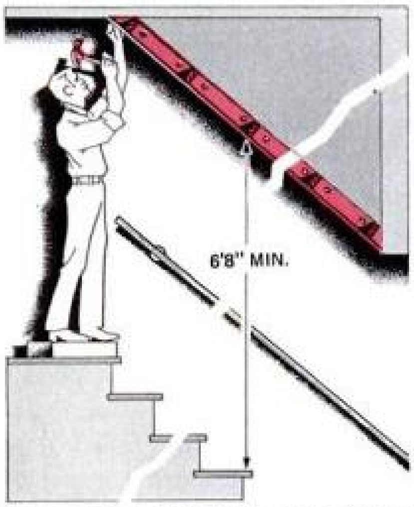
■ Install doors to all rooms (including dining room, if possible), so that seldom-used areas can be closed off when unoccupied for reasonable lengths of time, and their heating units shut down.



Unnecessary windows should be removed and closed in permanently.



Door installed at top of a stairwell prevents heat from going upstairs.



False ceiling installed over stairway eliminates a second-floor heat pocket.

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■ Fill in unnecessary or unused windows—remove frame, insulate cavity and finish off the exterior and interior to match their respective wall surfaces.

■ If your house roof provides the proper exposure and area, or if there is open space exposed to the southern sun in winter, consider installing solar collectors to provide water-heating energy. A number of good systems are now available (see page 131).

ADD-ON INVESTMENTS THAT CAN PAY OFF

■ Install a clock thermostat. It will automatically turn down the heat when you retire and back up in the morning before you awake, to preset temperatures of your choice. It can pay back its cost (about $70 to $140) in fuel saving in one or two years. It should be installed professionally. Clock-timer units that trigger heating elements beneath the thermostat and "fool" it into not activating the furnace switch until a desired time, are cheaper ($30 to $50). Not all are dependable, however. Consult your local heating specialist

Foam-filled steel door seals out the weather with a magnetic rubber strip.

for the best system for you, and insist on a binding warranty.

■ Don't overlook similar clock timers to control central airconditioning, if you have it. It's far cheaper to re-cool the house than to let the unit run for hours when you're not there.

■ New flue-pipe heaters that fit in the metal flue section leading

(Please turn to page 128)

Nothing seals like silicone. Nothing.

We think silicone is the best sealant your money can buy. See what you think. GE Silicone stays flexible down to −65°F. Ordinary caulks don't. GE Silicone withstands heat up to +500°F. Ordinary caulks won't. GE Silicone stays flexible. Ordinary caulks don't. GE Silicone can be applied in low temperatures. Ordinary caulks can't.

GE Silicone resists mildew. Ordinary bathtub seals may not. GE Silicone does not shrink. Ordinary seals do. GE Silicone lasts and lasts. Ordinary seals give out. GE Silicone won't crack, peel, dry out or discolor. You see, you get what you pay for with GE Silicone. General Electric Company, Silicone Products Dept., Waterford, New York 12188.

GE Silicone Sealants Work. Better. Longer.

GENERAL ELECTRIC

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from your furnace to the chimney, pick up waste heat that normally would go up the stack and put it to use where you direct it. The one shown is an Air-O-Space unit using NASA-developed heat pipes. They're available through most large heating supply outlets. They can salvage up to five percent of heat that normally would be lost to the outdoors.

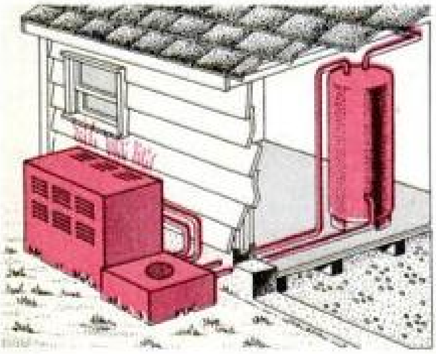
■ Automatic dampers that cut off

Clock thermostat made by Honeywell turns heat up and down automatically.

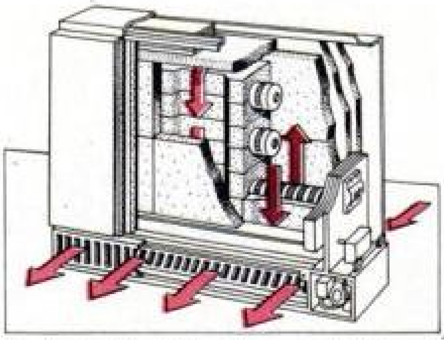
the flue when the furnace kicks off prevent firebox heat from disappearing up the chimney. They can save a lot of heat, but must be installed by experienced professionals. Improper installation can back up exhaust gases into the furnace room. If you're about to buy a new furnace, however, consider getting one with a built-in automatic flue damper.

■ If you heat by electric furnace, it may be well worth your while to switch to a heat pump—an air-conditioning-type device that draws heat from outside air (even when it's below zero) to warm the house, and reverses in summer to provide cooling. "Whole house" units cost about $2000 but can cut consumption of the energy required by an electric furnace as much as 40 percent.

■ A less expensive energy-saver is a new add-on heat pump from York Air Conditioning. The "Maximizer" indoor coil fits on any type



ECU's waste-heat device uses airconditioner exhaust to heat water.



Control Electric's Storage Heat unit saves warmth for off-peak use.

furnace to provide heat in winter and airconditioning in summer at considerable savings.

■ Another interesting energy-saver is a heat-recovery device the size of a large metropolitan telephone book. The unit, made by Energy Conservation Unlimited in Longwood, Fla., hooks up to the hot-air exhaust of central airconditioners and uses the waste heat for hot water production.

Bronze reflective Solarcool glass by PPG makes storm sash for summer.

■ Add a hot-water circulator to the fireplace to blow heat into the room that otherwise would be lost up the chimney (see page 144 for a rundown on these devices).

■ If you have no fireplace damper, install glass doors in the opening. They'll not only serve as a damper when the fireplace is not in use, but can be shut to snuff out the fire when you retire or leave the house.

■ Put in an attic fan if you have none, and use it to bring outside air in through open windows on the shady side when it's 78° or less outdoors in summer. The airconditioner is wasting kilowatts when it's that cool outside. The fan uses far less energy.

Flue radiator from Stoneberg uses furnace-flue heat to warm a basement.

■ Heat loss via the exterior entry door to your home can be substantial. Now it can be cut up to 16 percent by a new steel door with a honeycomb and foam core. The unit is designed to replace your combination storm door and exterior wood door. It's made of 24-gauge steel and has an insulating value more than two times that of wood. ERDA engineers used it with magnetized rubber weatherstrip for a perfect seal.

■ Buy lamps with three-way switches and use the lowest wattage until you *need* more light. Better yet, install solid-state dimmers to control all of the lighting in the house. They can cut your lighting bill by up to one-third if properly used.

■ If you cook with gas, make your next stove one with piezoelectric ceramic starters instead of a pilot light. They'll save you the 30 percent extra gas that those pilot lights consume.

■ Make sure your next refrigerator has a power-saver switch to cut out the heating elements in the walls and doors (when not needed) to prevent condensation in humid weather. Also insist on manual defrost. Automatic uses more energy.

■ If your TV has an "instant on" feature, it's never really turned off. Use the "vacation" switch. And when you buy a new set, insist on one without the "instant on" gadget. It's costing you money.

■ Even if you have storm windows, a third pane of glass will cut the window heat loss in your home by a measured third. If you have central airconditioning, you may want to consider PPG's bronze glass, which cuts solar penetration in the summer. ★★★

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THERE'S ONE INSULATION FOR ALL KINDS OF WEATHER.

With all the changes in the weather, one thing remains the same. . .the cost of keeping your home comfortable is going nowhere but up. Ever higher fuel and electric rates are here to stay.

There's one insulation designed to stand up to every kind of weather: Rapco Foam.

Rapco Foam Can Cut Your Energy Use in Half*

Winter or summer Rapco Foam can save you hundreds of energy dollars. Inch for inch, it's the most efficient home insulation you can buy. Nearly twice the thermal protection of batt insulation. Rapco Foam fills the most hard to reach places in your walls. It seals out drafts and virtually eliminates air infiltration. In high humidity, when other insulations go limp, moisture-resistant Rapco Foam goes right on protecting your home and saving you money. It won't settle or decompose and it's one of the safest insulations you can buy.

Simply put, nothing else you can buy for your home can insulate as well.

Any home regardless of construction can be reinsulated, usually in one day. There's a qualified Rapco applicator in your neighborhood. For his name and free literature call or write today.

*Assuming wall and attic insulation.

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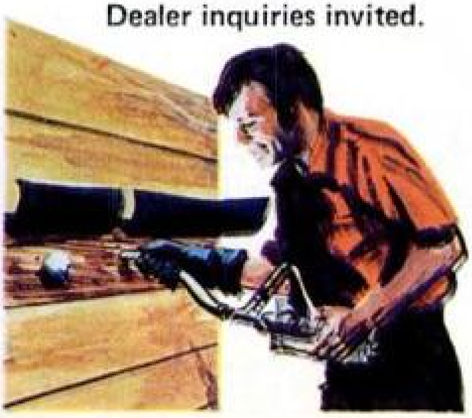
Dealer inquiries invited.



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The Rapco™ Foamers — High Efficiency Home Insulation

Rapco Foam Insulation is sold by licensed applicators carrying a currently dated certificate of qualification. Ask to see it.

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Which end of the screwdriver do you buy?

Start with the tip. The Workmaster corners are sharp and clean, with careful cross-ground surfaces for a firm, better grip in the screw slot. The blades are polished and plated to look good and last longer. Now go to the handle.

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HOW TO GET HOT WATER FROM THE SUN RIGHT NOW

When you've done all you can to cut energy use and waste in your home, the only way to trim those bills more is to *add* energy somehow. One way to do that—without spending your life's savings—is to install a solar domestic hot-water system.

Even though sunlight is free, the equipment needed to capture it isn't. Yet you can probably install a system that provides 50 percent of your hot water (60 sq. ft. of collectors, as a rule, for a family of four) for about $1200, or twice that if you opt for professional installation. These prices are far less than the $6000 to $12,000 you'd have to shell out to get solar space heating—which is usually too complicated for do-it-yourself installation, especially in existing homes.

Solar hot water is relatively easy to retrofit. A small collector array can go on the roof, against a wall, or on a separate support frame in the yard—while solar space heating requires a collector area equal to one-third to one-half the floor area to be heated. You need a large, strong, properly angled roof for such an array.

COST-EFFECTIVE NOW IN MOST PARTS OF COUNTRY

An ERDA study (done last year, when fuels were cheaper) has shown that solar water heating, at a total system cost of $20 per square foot of collector, is cost-effective now in most parts of the country, beating electric resistance heating in all but one of the 13 cities considered. Payback time (system cost divided by annual savings) ranged from 9 to 13 years in the other 12. The payback period will keep getting shorter as conventional-energy prices go up.

ERDA also notes that if new technology and government incentives combine to reduce system cost to $10 per square foot by 1980, solar hot water and solar space heating will then be

(Please turn to page 133)

Collector made by Solarcell is a nontracking concentrating type that focuses sunlight onto ¾-in. copper tubing that has a heat-absorbing black coating.

More common in hot-water systems are flat-plate collectors like these from Sunworks. Installation shows a relatively small collector area is needed for water heating, even in New England.

External heat exchanger on lower half of storage tank in Sunstream system.

Lennox system tank has factory-mounted controls, feeds normal heater.

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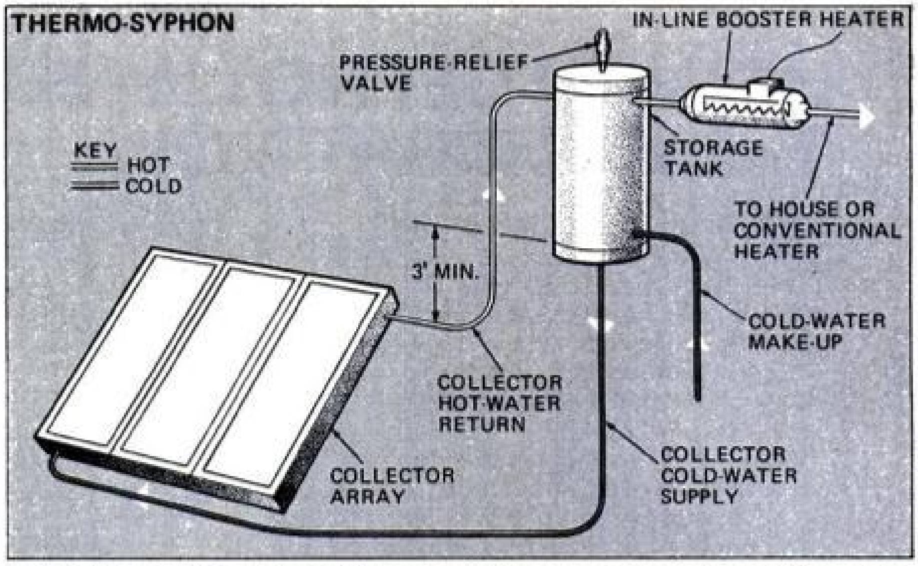
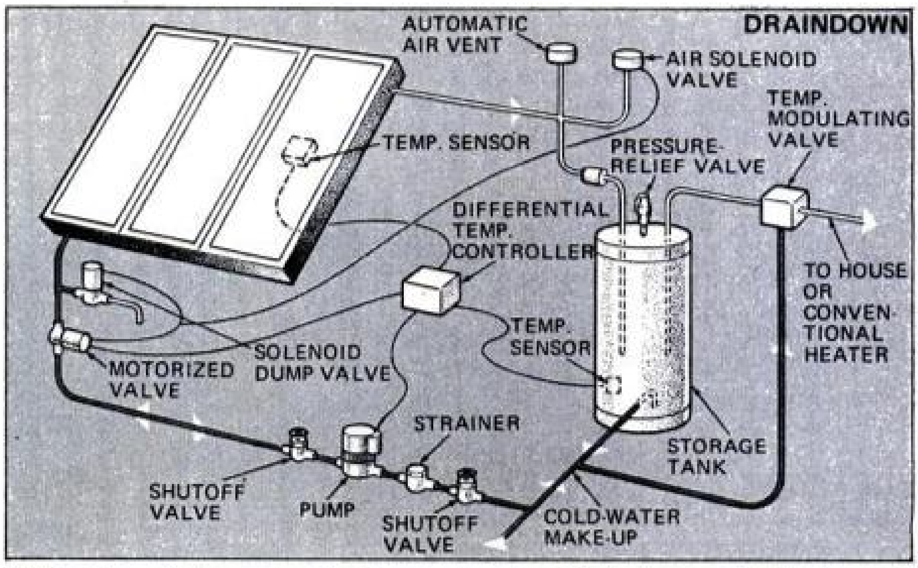
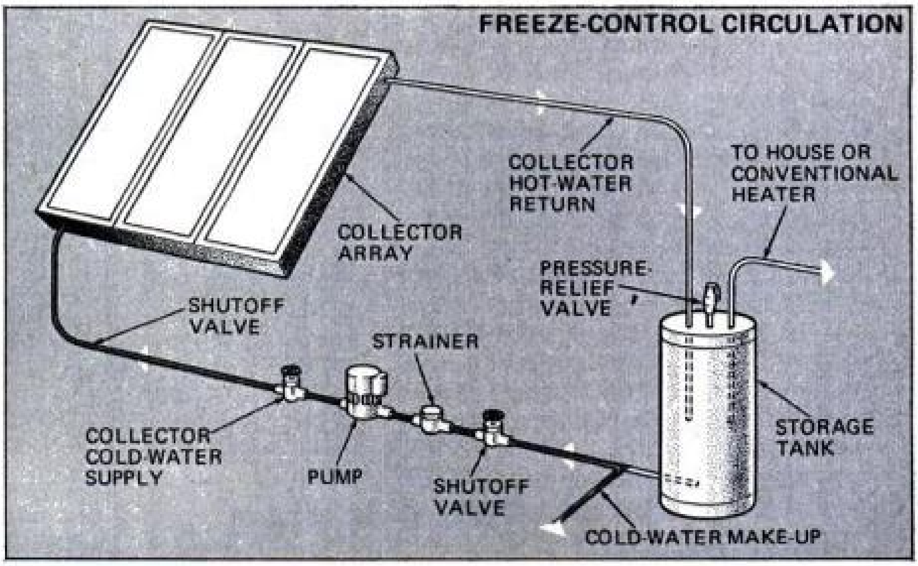


Essentially passive system relies on gravity and convection to circulate water: Cold water flows from bottom of tank to bottom of collector, returns when warmed.



Elaborate controls are needed to assure automatic drainage of collectors and pump cutoff when temperature falls to freezing or collectors can't warm water.



Simpler system loses efficiency because water must be heated to keep it moving through collectors during periods of below-freezing temperatures.

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competitive with all conventional fuels.

A first step in incentives has been taken with a $10.5-million batch of federal grants for solar water systems for homes ($400 each), hotels and motels in 11 states. The application deadline for this round of grants has passed, but more, broader and richer programs are likely in the future.

System basics

The collector is the guts of any solar system. As commonly used for solar hot water, it has an absorber plate covered with a special selective surface or painted flat black to collect light and convert it to heat, plus tubing attached to the plate to carry the heat-transfer medium (water, water plus antifreeze, or air) that gathers the absorbed heat and takes it to the point of use. The absorber plate is enclosed in an insulated frame and covered with glass or transparent plastic.

Collectors should be pitched at an angle equal to local latitude, but a variation of 10° either way (to suit a roof's pitch, for example) can be accepted—and in some cases it can pay to tip them forward to pick up sunlight by reflection from a horizontal surface. Similarly, collectors are usually oriented to point due south, but variation of up to 20° either way is acceptable and may be necessary to make the installation practical. Other factors that need attention are shading of collectors by trees or parts of the house and snow accumulation on the array.

A solar hot-water system is really a preheater, using conventional heating to give the water a final boost to the desired temperature. It requires much less conventional energy than a normal system. Most solar systems use a separate storage tank that supplies the tank of a conventional heater—which also provides backup for night and for cloudy days.

Five systems

With all the many kits and components coming onto the market, there are still just five basic types of solar hot-water systems in common use.

Simplest is the thermo-syphon setup, which depends on gravity and convection to circulate water

(Please turn to page 136)

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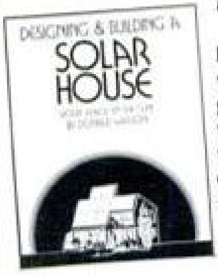

DESIGNING & BUILDING A SOLAR HOUSE, *by Donald Watson,* member, visiting faculty, Yale School of Architecture. Here's the "Plain English" guide that puts solar homes and heating within your reach NOW! Award-winning architect Watson puts himself in your shoes every step of the way—from picking a site, to choosing a plan and equipment, to figuring cost, to showing how to do a lot of the work yourself! Complete with source guide to parts and materials.

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Here's a booklet from Swingline with some practical "button up" ideas for properly insulating your home. Explains many insulating techniques and the various materials that can be used. 50¢.

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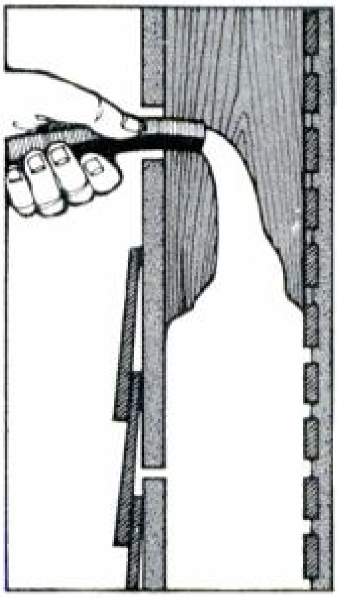

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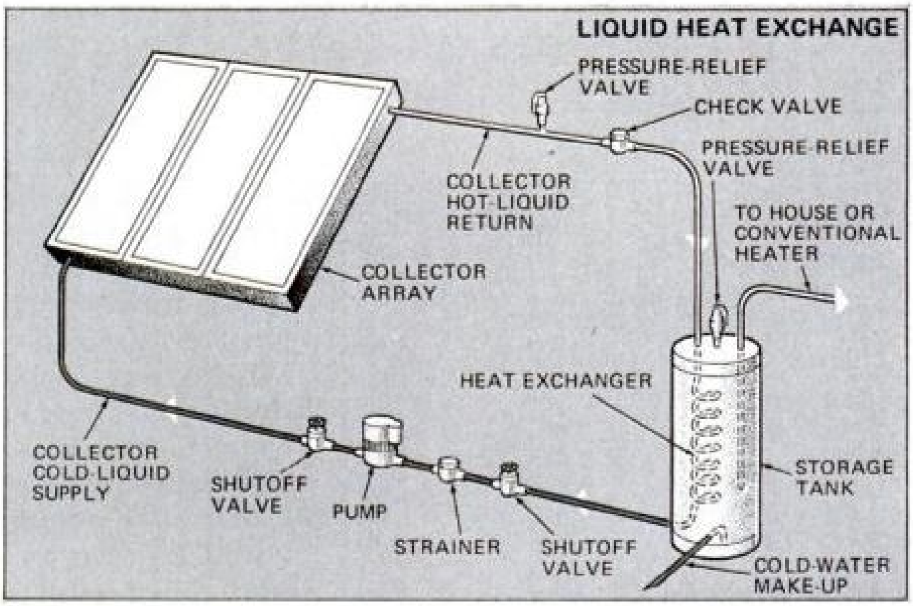
through its collectors. It requires a water storage tank located near and slightly above the collector array. Such a system is fine where there's plenty of sunshine and the temperature rarely dips to 32° F., but in most parts of the country, water can freeze and wreck the whole works. Frequent manual draining—a nuisance—or a resistance booster heater can prevent freeze-ups, but flow rate and temperatures remain difficult to control in a thermo-syphon system.

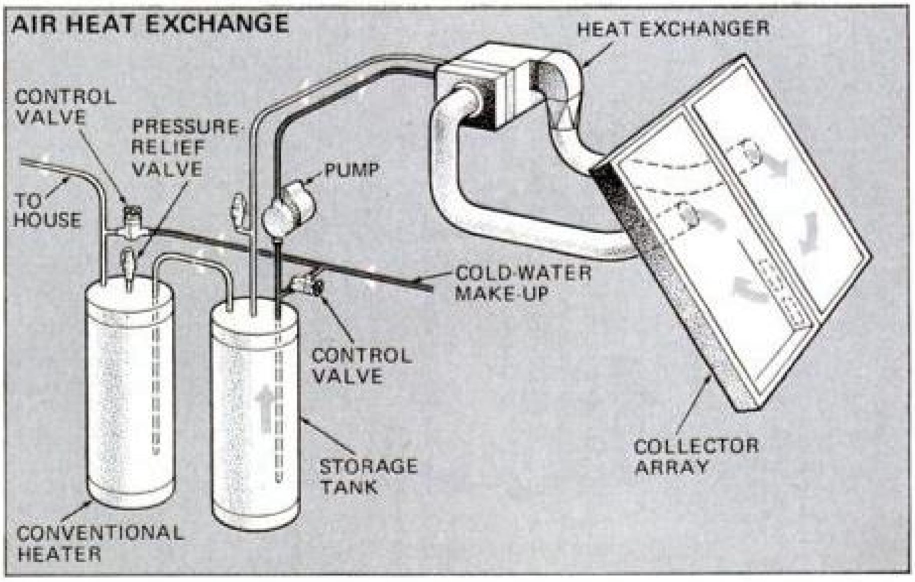
The four other systems allow a more remote tank location. In the draindown type, a pump moves water through the collectors only when there's enough sunlight to prevent freezing and to produce useful heat. At other times, the pump is automatically shut off and the collectors are simultaneously drained.

A less common system uses what's called freeze-control circulation from storage. Warm water is kept moving in the collectors when the temperature drops to freezing. It's less efficient than a draindown system because it uses heat to warm the collectors, but it gives the advantage of simpler controls.

An obvious way to keep collectors from freezing is not to run plain water through them. You can use an antifreeze solution instead and make this liquid surrender its



Liquid medium in collectors won't freeze since it's an antifreeze solution—but there must be absolutely no mixing of antifreeze with domestic water supply.



Using air as a heat-exchange medium eliminates both the hazard of collector freeze-up and the danger of contamination of house water with antifreeze.

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gathered heat to the water through a heat exchanger, usually a coil of tubing inside or around the outside of the tank. But this requires care. Most antifreezes are poison, and some local codes require a double-wall heat exchanger to keep house water and collector medium separate. The antifreeze solution also must be replaced periodically as it tends to become corrosive.

The heat-exchanger idea can also be used with air as the medium. Water from the tank is pumped out to a motorized heat exchanger, then returns to the tank. Both liquid and air heat-exchange setups are less efficient than heating the water directly, but they do eliminate the freezing problem.

Cautions: Regardless of the system you're considering, be wary when shopping for solar equipment—some manufacturers make impossible claims. A good guide to self-protection is *Buying Solar*, $1.85 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (ask for Stock No. 041-018-00120-4). Also ask anyone who wants to sell you solar equipment for names of other customers, and check with them. Get a guarantee, too. Systems can vary greatly in cost, yet work about equally well. How long they'll last is the question that's still hard to answer.

MANUFACTURERS

Explosive growth of the solar-energy field makes it virtually impossible to keep track of all the firms active in it—there are new ones almost daily. The most comprehensive listing of manufacturers in the solar hot-water field—234 of them—is included in the booklet *Solar Hot Water and Your Home.*

To get this free booklet, as well as a list of solar-equipment distributors in your state, write to the National Solar Heating and Cooling Information Center, Dept. PM, Box 1607, Rockville, Md. 20850. It should be understood that inclusion in either list does not imply endorsement by *PM* or by the government of a company's products or business practices. ★★★

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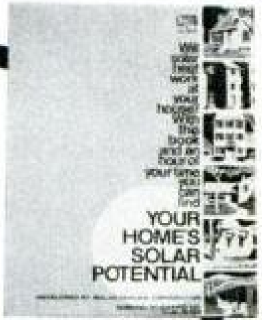

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GET MORE HEAT BY BURNING WOOD

One way nature stores solar energy is in plant tissue. One way to get that energy back without waiting millions of years for coal or oil to form is to burn plant tissue, and the plant tissue that burns best is wood.

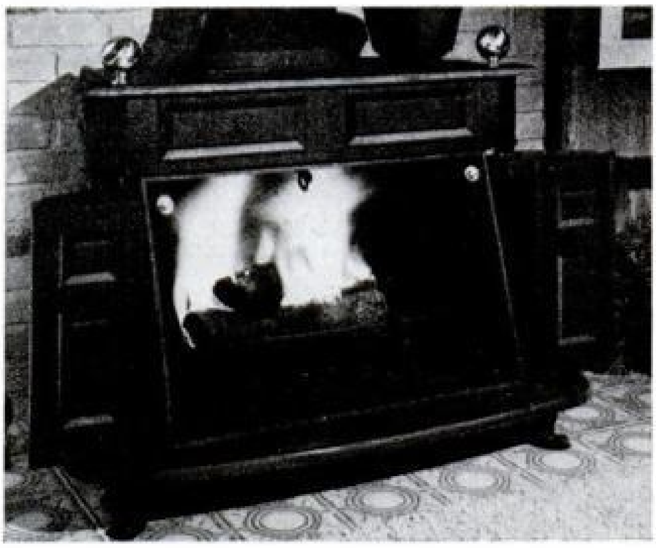
Not only is wood the oldest fuel; it *can* be the most economical—if burned efficiently. While figures vary, most experts agree the average fireplace delivers to a room about 10 percent of the energy in the wood. By using a better burner, you can raise that

EVEN PURCHASED FIREWOOD CAN YIELD HEATING-COST SAVINGS

to 50 or 60 percent, or more. Then the cost of burning wood is competitive with conventional fuels.

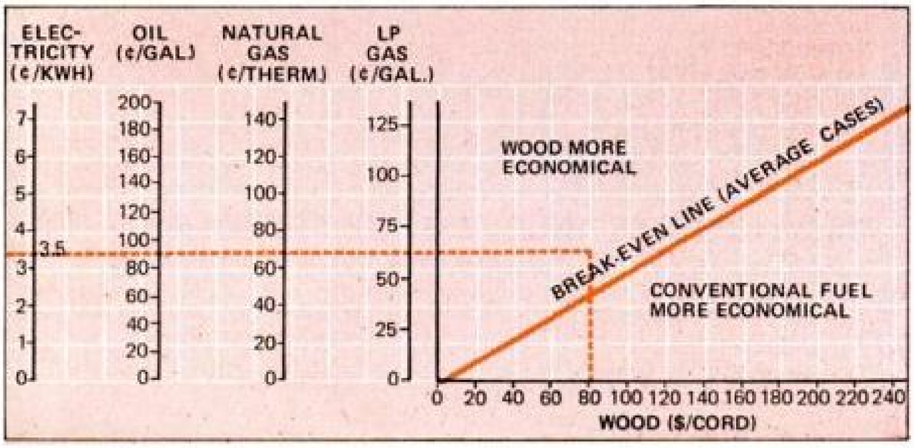
When you can fell or gather your own firewood, costs become ridiculously low, but even where you must buy cordwood (a full cord is a 4x4x8-ft. stack of logs), wood heating can be a bargain. The graph below shows how it works. If the conventional heat in your house is oil and you're paying 50 cents a gallon for it, you can pay up to $85 a cord and still save. In the example shown by the dotted lines, with electric resistance heat at 3½ cents per kilowatt-hour, and firewood at $80 a cord, the lines representing these prices meet above the break-even line, indicating that wood is more economical.

(Please turn to page 143)



A Franklin stove like this one, sold by Montgomery Ward, is cheery but little more efficient than a fireplace, giving only 25 percent of the wood's energy to the room as heat. Montgomery Ward also sells more efficient closed stoves and heaters.

Defiant parlor stove (above) is claimed to be high-efficiency all-purpose unit; front doors can be opened for fire-viewing. Reginald at left, an Irish import, is a small box stove sold in kit form. Norwegian Jotul below is typical of Scandinavian box stoves designed to maximize secondary combustion.



Is wood worth it? Find price of your conventional fuel at left, price of wood at bottom of graph. Meeting point tells (roughly) whether you can save with wood.

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FEDERAL ENERGY ADMINISTRATION
WASHINGTON, D.C. 20461

OFFICE OF THE ADMINISTRATOR

To the readers of Popular Mechanics:

September is the time when many of America's 74 million households are making home improvements. Today, more than ever, activity is concentrated on ways to save energy and reduce utility bills.

Almost 20 percent of U.S. energy is now used to heat and cool buildings. Much of that is inefficiently used due to faulty or inadequate insulation, caulking, and weather-stripping.

Such homes rob the owners of the energy they pay for. The loss is in air conditioning in the summer, heating in the winter, and higher utility bills all year.

For this reason, much of the information contained in this issue of Popular Mechanics should be especially interesting and valuable. But there is another, broader reason: energy conservation is the fastest, cleanest, and least costly way to help solve the Nation's energy problems.

The scarce oil and natural gas that we save today will be available to prevent shortages tomorrow. And the more we save now, the more there will be available for feedstocks and the vast range of by-products of oil and gas in the future.

So, the steps that many of you are taking these days to improve the energy-efficiency of your homes have a significance beyond satisfaction of a job well-done.

There is energy to be saved, and your home improvements, collectively, will help us conserve it. Individually, those improvements will help you reduce your fuel bill. In short, the difference you make makes all the difference.

Sincerely,

John F. O'Leary
Administrator

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Most of us know how to use a fireplace, but burning wood for heat calls for a review of the basics. The first thing that happens when wood is burned is that moisture is released from it. Air-dried wood typically has a moisture content of about 20 percent by weight, and this moisture must be driven off—this is the first task of the heat supplied to the wood. As moisture is released, solid wood begins to burn, and in doing so releases gases known as volatiles. A complex mixture of organic chemicals makes up the volatiles, and they represent a large proportion of the energy stored in the wood. *They must be burned for maximum efficiency*; those that aren't will contribute to creosote buildup in flue and chimney. (Every stove produces some creosote.)

Stovemakers have worked out various designs meant to assure secondary combustion, as the burning of volatiles is known. All involve a second stream of air—secondary draft—to supply oxygen to burn these gases, with heat from burning solid wood providing the required ignition temperature. One such design is shown schematically on page 143.

Whether or not a stove is intended to approach complete combustion of wood, the concept of draft remains important. It's the regulated supply of combustion air, and it helps determine how long and how hot a given quantity of wood will burn. The lack of closely regulated draft is the reason fireplaces and open stoves are inefficient.

Two-legged Better 'n Ben's uses existing fireplace for flue and chimney; delivers more usable heat to room.

Country Craftsmen kit is set of castings for barrel stove.

Cabinet-enclosed circulating heater by Shenandoah can warm several rooms.

Jotul No. 4 delivers closed-stove performance; door drops down and swings underneath when you want to give up a little efficiency for the pleasure of seeing the fire.

HEAT VALUE OF WOOD

This table by the U.S. Forest Service lists the relative heat of 33 dry woods, with hickory equaling 100, and compares densities to water. Denser woods burn longer; less dense woods ignite and burn faster.

Species	Density	Heat Value
Osage orange	.78-.83	112
Dogwood	.70-.79	100-107
Hophornbeam	.70-.75	100-101
Hickory	.70-.74	100
Oak	.60-.73	86-99
Black locust	.69-.70	95-98
Blue beech	.65-.71	93-96
Beech	.64-.66	89-91
Hard maple	.58-.65	83-88
Birch	.55-.64	79-86
Mulberry	.59-.63	84-85
Apple	.58-.62	83-84
Ash	.57-.61	81-82
Southern pine	.51-.60	73-81
Elm	.50-.59	71-80
Walnut	.52-.55	74
Soft maple	.47-.54	67-73
Tamarack	.49-.53	70-72
Cherry	.50-.52	70-71
Sycamore	.49-.52	70
Gum	.48-.52	69-70
Douglas fir	.45-.51	64-69
Sassafras	.44-.46	62-63
Chestnut	.42-.44	59-60
Spruce	.41-.44	59
Tulip or yellow poplar	.40-.42	57
Hemlock	.40-.42	57
Cottonwood	.38-.41	54-55
Balsam fir	.36-.40	51-54
Redwood	.33-.40	47-54
Aspen	.37-.39	53
Basswood	.37-.39	53
White pine	.35-.37	50

The majority of the modern-design stoves are "airtights," meaning that flue and draft are the only passages through which air and flue gases can pass into or out of the stove. In an airtight stove, draft can be set so that a load of wood will burn all night; those with bimetallic-strip thermostats (first patented in 1842) can open and close the draft automatically to meet heat needs.

The wide range of wood-burning appliances today can be broken down into open stoves, closed stoves and heaters, circulating heaters and furnaces.

Open stoves, like the traditional Franklin, are relatively inefficient. Some newer designs, like the Defiant and the European Combi-fires, let you have both efficient closed-stove operation and the pleasure of a visible fire—but not at the same time.

Closed stoves, which heat their

(Please turn to page 143)

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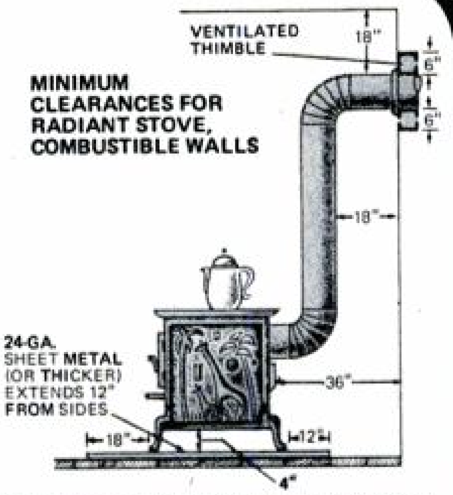
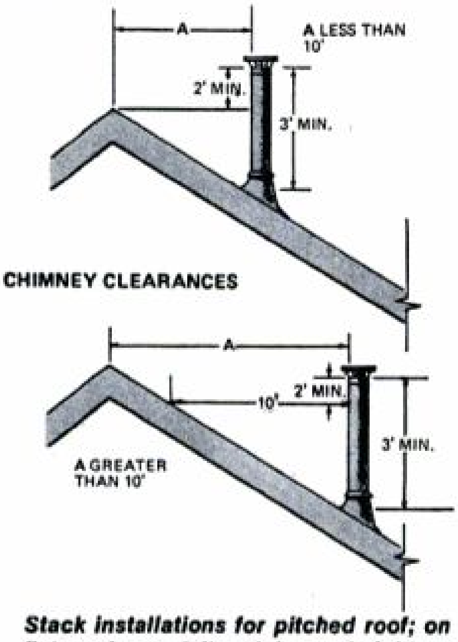
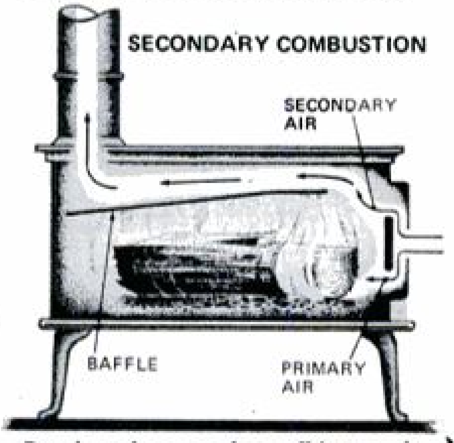


Clearances are smaller for circulating heaters, protected or noncombustible walls; follow stove and flue-pipe manufacturers' instructions carefully.



Stack installations for pitched roof; on flat roof use 3-ft. minimum height or 2 ft. more than nearby projection.



Burning of gases given off by wood requires supply of extra air (see text).

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(Please turn to page 144)

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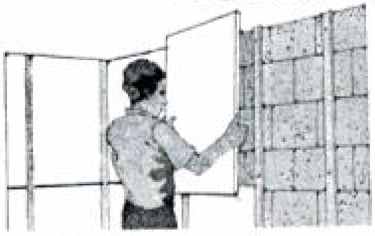

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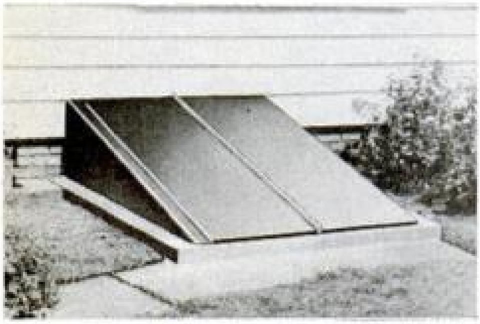

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small barrel-stove kit. Their efficiency at extracting heat from wood averages about 50 percent.

Circulating heaters don't heat by radiation, but heat air and move it to the room, either by convection alone or with the aid of a blower. In their trim cabinets, they hardly look like wood stoves, yet they provide 60 percent efficiency or better.

When a circulating heater is jacketed in a plenum connected to ductwork, it has effectively crossed the line into the furnace category. Furnaces now on the market include designs for mixed operation—letting you mix wood and oil or gas to meet your heating needs—with water-heating coils built in. Prices for these units are, of course, in the same range as those for conventional furnaces—plus a little more for that extra capability. But they may be worth considering if it's time to replace an oil or gas-burning furnace.

Stoves are made of cast iron or sheet metal. Cast-iron buffs sneer at steel, but some experts feel there's no reason to prefer one to the other—except to suit heating properties to intended use: A small steel stove will heat up fast, but it cools fast. A cast-iron stove will retain heat over a longer time, but it takes longer to produce usable heat.

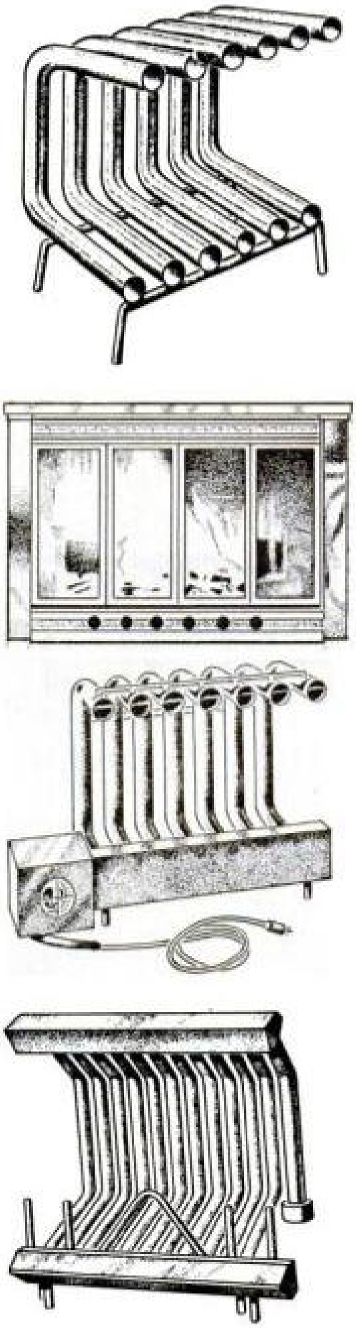
In terms of durability it's a toss-up. If a stove is overfired, cast iron can crack, while steel can warp. A stove or heater may have a liner of metal or firebrick. This can help hold heat and maintain high firebox temperatures, but many popular stoves have none.

MANY BELIEVE IT'S A TOSS-UP BETWEEN STEEL AND CAST IRON

Safe installation depends on two things: keeping everything that gets hot (stove, flue and chimney) separated from combustible materials, and avoiding the creosote buildup that can cause chimney fires. (See drawing on page 143.)

Cautions: Never burn coal or cannel coal in a store or heater designed for wood. Don't overfire *any* stove. Never burn manufactured logs anywhere but in an open fireplace—they contain wax that burns dangerously hot. Don't cheat on stove or chimney installation clearances.

For further reading: *The Complete Book of Heating with Wood* by Larry Gay, Garden Way Publishing, $3.95; *Modern and Classic Woodburning Stoves* by Bob and Carol Ross, Overlook Press, $10; *Wood Heat* by John Vivian, Rodale Press, Inc., $4.95; *The Woodburners Encyclopedia* by Jay Shelton and Andrew B. Shapiro, Vermont Crossroads Press, $6.95. ★★★



If the cost—or look—of a stove isn't for you, you can make your fireplace a bit more efficient with one of these accessories. From top: convection grate, glass doors combined with convection grate, forced-air-grate, water-heater.

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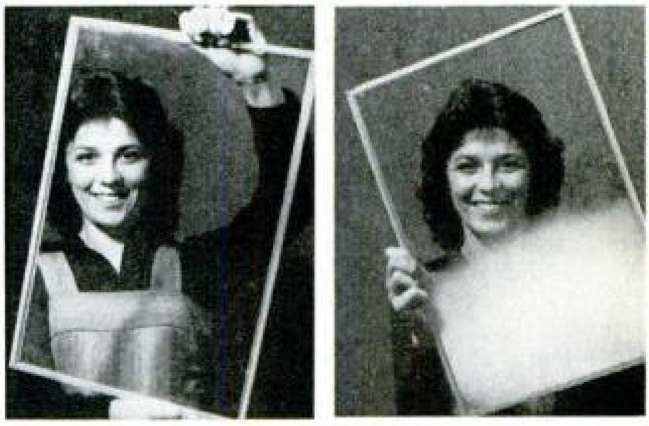
WHAT'S COMING UP IN ENERGY SAVERS



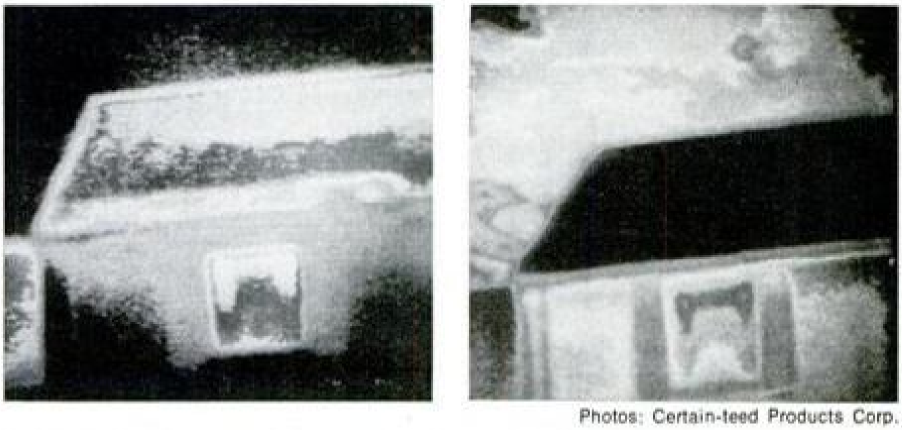
Heat sensitive glass is transparent when cool (left), but turns opaque when subjected to sun's heat, preventing transfer of solar radiation into airconditioned rooms. Units will be used as summer storm sash.

Thermally improved window developed at ERDA's Brookhaven National Laboratory on Long Island, has louvers between glass sheets. They prevent movement of dead air between panes, increase insulation factor of window.

You, or your community, soon will be able to subscribe to a service (available now to a limited degree, but expensive) that provides infrared photos of your home at reasonable cost, showing where heat escapes. Then you can plug those energy leaks. It's one of many upcoming systems under development (or sponsored) by ERDA, aimed at trimming fuel consumption. Others include:

- Fluorescent bulbs that look like regular incandescents and fit standard sockets. They'll use 70 percent less electricity, last up to 10 years, give a mellow light.
- Heat-sensitive window glass that turns opaque under the summer sun's rays, preventing solar radiation from passing through into airconditioned rooms. When cool, the glass remains clear.
- Windows with horizontal aluminized strips at half-inch intervals between two glass panes. The louvers prevent convection currents that cause heat loss in conventional thermo-windows, and provide insulation equal to two-and-a-half inches of fiberglass.
- Windows that include a heat mirror and shutter that operates optically between two glass layers. The shutter switches from transparent to translucent under different sun conditions. It will pass light but reject heat in summer. Manual controls will reverse the operation in winter.
- Refrigerators and freezers that use half the electricity required by present ones. They'll be combined with water heaters so the waste heat can be used to produce domestic hot water. Other household devices are being similarly combined in "integrated appliances," where the waste product of one offers energy for the other.
- Energy swapping on an even larger scale is in the works at ERDA's Holifield National Laboratory in Oak Ridge, Tenn. Called "Annual Cycle Energy System" (ACES), it involves an insulated tank of water in or beneath a house basement. During winter, heat is removed from the water by a heat pump, to warm the house. By winter's end, with much of its latent heat removed, the water is ice—which then provides means for cooling the home's air in summer. The system has proven applicable to well-insulated homes in latitudes between Georgia and Minnesota. Rule of thumb: two cubic feet of water per square foot of living space. Extra cost (at current prices) over conventional installations in new work: $1700; to retrofit an old home: $3000.
- Automatic control of heating, ventilating, airconditioning and lighting (in public buildings) according to the number of occupants. Sensors will detect people coming and going, and alert a computer that does the rest. ★ ★ ★

New fluorescent bulb will fit standard socket, cost about $8 and last 10 years.



Photos: Certain-teed Products Corp.

Infrared photos reveal "hot spots" of escaping heat from homes (left). New service soon will be priced so most homeowners can find "leaks" and plug them.

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GROUPS THAT CAN HELP YOU START USING SOLAR ENERGY

You don't have to be a scientist or engineer, or own a solar-powered home, to join a solar energy organization. All you really need is an interest and a few bucks, and you can start talking with others who share your interest and learning from the experiences of those who've already put the sun to work. Most groups below are local in nature; listings are alphabetical by state. An asterisk (*) means the group is a chapter of the International Solar Energy Society, American Section (see Florida).

Alabama Solar Energy Assn., c/o The University of Alabama, Center for Environmental & Energy Studies, Box 1247, Huntsville, Ala., 35807.

**Northern Alabama Solar Energy Assn.; c/o Robert B. Lollar, 1915 Waxleaf Green, Huntsville, Ala. 35803.*

**Arizona Solar Energy Assn., c/o Russell Clark, Box 7, Flagstaff, Ariz., 86001.*

Arizona Solar Energy Research Commission, Capitol Tower, Rm. 502, 1700 West Washington, Phoenix, Ariz., 85007.

**Northern California Solar Energy Assn., c/o Kinsell L. Coulson, Hoagland Hall, University of California, Davis, Calif., 95616.*

**Southern California Solar Energy Assn., c/o John T. Brand, Box 6150, Rte. 2, Escondido, Calif., 92025.*

Citizens for Energy Conservation & Solar Development, Inc., Box 49173, Los Angeles, Calif. 90049.

Los Angeles Solar Energy Group, 1605 Sherrington Pl., Suite 7212, Newport Beach, Calif. 92660.

Solar Energy Society of America, 2780 Sepulveda Blvd., Torrance, Calif., 90510.

**Boulder Solar Energy Society, c/o Dr. Joseph H. Pope, NOAA Environmental Research Labs, Boulder, Colo., 80302.*

Colorado Solar Energy Assn., c/o University of Colorado, 1100 14th St., Denver, Colo., 80202.

Environmental Action of Colorado, 2234 East Colfax Ave., Denver, Colo. 80206.

Mountain Area Domestic Solar Energy Technical Consortium, RR 2, Box 274, Evergreen, Colo., 80439.

Connecticut Solar Energy Assn., Box 541, Hartford, Conn., 06101.

The Solar Solution, Inc., 6802 Walker Mill Rd., S.E., Washington, D.C. 20027.

International Solar Energy Society, American Section, 300 State Rd. 401, Cape Canaveral, Fla., 32920.

**Georgia Solar Energy Assn., c/o R.F. Fredette, Georgia Tech, Campus Box 32743, Atlanta, Ga., 30332.*

Committee for Alternative Energy, 53 West Jackson, Chicago, Ill., 60604.

Central Illinois Solar Energy Assn., c/o Dr. John H. Martin, Scheaffer & Roland Inc., 20 North Wacker Dr., Chicago, Ill., 60606.

**Northern Illinois Solar Energy Assn., c/o J.A. Hartley, Box 352, Argonne, Ill., 60439.*

Central Illinois Solar Energy Society, 1 Ramblewood Dr., Rochester, Ill., 62563.

Alternative Technologies Assn., Box 20571, Indianapolis, Ind. 46220.

**TERRA, c/o Arthur C. Meyers, 1612 Burnette, Ames, Iowa 50010.*

Citizens United for Responsible Energy, 1342 30th St., Des Moines, Iowa 50311.

Iowa Energy Policy Council, 707 East Locust St., Des Moines, Iowa 50319.

The Solar Energy Society, Smithsonian Labs, 12441 Parklawn Dr., Rockville, Md. 20852.

Project Conserve: Mass. PIRG, 233 North Pleasant St., Amherst, Mass. 01002.

**Michigan Chapter ISES, Edward J. Kelly Jr., c/o Sun Structures, 225 E. Liberty St., Ann Arbor, Mich. 43104.*

Missouri Solar Energy Assn., Dept. of Mechanical Engineering, University of Missouri, Columbia, Mo. 65201.

Committee for Environmental Information, 430 North Skinker Blvd., St. Louis, Mo. 63130.

Midwest Energy Alternatives, Box 83202, Lincoln, Neb. 68501.

Solar Survival, Cherry Hill Road, Harrisville, N.H. 03450.

Solar Energy Assn. of New Jersey, Box 87, Princeton, N.J. 08540.

Princeton Energy Group, 245 Nassau St., Princeton, N.J. 08540.

**New Mexico Solar Energy Assn., c/o Keith W. Haggard, Box 2004, Santa Fe, N.M. 87501.*

**Metropolitan Solar Energy Society, Joseph Cuba c/o ASHRAE, United Engineering Center, 345 East 47th St., Rm. 302, New York, N.Y. 10017.*

**Eastern New York Solar Energy Society, c/o Donald L. McClenahan, State University of New York at Albany, Atmospheric Sciences Research Center, 1400 Washington Ave., Albany, N.Y. 12222.*

**North Carolina Chapter ISES, c/o C. Leon Neal, North Carolina Science & Tech. Resident Center, Box 12235, Research Triangle Park, N.C. 27709.*

**Ohio Solar Energy Assn., c/o Joseph Barbish, Solar Home Systems, Inc., 12931 West Geauga Trail, Chesterland, Ohio 44026.*

Columbus Solar Energy Society, Box 333, Dublin, Ohio 43017.

**Oregon Solar Energy Group, c/o Lee Johnson, Rain Magazine, Box 751, Portland, Ore. 97207.*

**Mid-Atlantic Solar Energy Assn., c/o Robert Bennett, Dept. of Architecture, Graduate School of Fine Arts, University of Pennsylvania, Philadelphia, Pa. 19104.*

**Puerto Rico Chapter ISES, Alfredo M. Gonzales, Box 3011, San Juan, P.R. 00936.*

**South Carolina Chapter ISES, Joseph Harden, c/o Solar Sources Corp., Bankers Trust Office Park, 6 Pope Ave., Hilton Head Island, S.C. 29928.*

**Tennessee Chapter ISES, Prof. Edward Perry, c/o Memphis State University, M.E. Dept., Memphis, Tenn. 33152.*

**Texas Solar Energy Society, c/o Peter E. Jenkins, Texas A & M University, Mechanical Engineering Dept., College Station, Tex. 77843.*

**New England Solar Energy Society, c/o John T. Schnebly Jr., Box 541, Brattleboro, Vt. 05301.*

**Virginia Solar Energy Assn., c/o John G. Lewis Jr., Box 12442, Richmond, Va. 23241.*

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A FLYING RV

(Continued from page 103)

Climbing into cockpit, Cindy passes box with rolled-up awning above cabin door.

On island in remote mountain lake, chopper crew can fish soon after touch-down.

TV, refrigerator and galley range next to forward couch ease roughing-it aboard.

Instant hunting camp set up with ground cloth, awning, folding chairs and a table.

Bunks for sleeping aboard in cabin make up quickly from facing seats and dinette.

problem. Your Heli-Home comes with full navigational equipment that includes visual omni-range navigation indicator, transponder, VHF transceiver with 360 channels, emergency locator transmitters, plus dual flight controls, full night lights, dual landing lights and an electro-mechanical cargo sling. Though a big machine, we found it remarkably sensitive in flight and easy to over-control at first. Once on the ground, however, with awning extended to form a patio outside the cabin door, table and easy chairs set up and drinks prepared, we discovered we could adapt to this luxury-camping way of life almost instantly.

Easy to find campsites

Locating campsites proves remarkably easy. With our outdoor photo-ace Jim Tallon riding shotgun up with pilot Dan Greve, we choose a small lake northwest of Scottsdale and hover over a tiny island out from shore. From 20 feet up we pick an almost level slope of beach, check it for boulders and soft spots and then slowly settle in. Within minutes we have our awning extended, a Versa Tarp spread out as ground cloth, table and chairs unfolded and set up, the little Pack Raft inflated, and we're ready to head out and tempt a few fish. Ashore, Cindy Mulgrew builds a campfire of driftwood in case the fishermen get lucky and starts coffee perking. Time from air to offshore action: about 10 minutes.

Later in the afternoon as a cloud cover moves in and the fish all take an afternoon nap, we see sunlight far across the desert, strike camp, and head for it with about the same pack-up time. In 20 minutes we are scouting a sunshine-flooded canyon and sit down next to an oasis of cottonwoods moments later, miles from the nearest road or settlement. Try *that* with a backpack, boat or 4WD!

Climbing the cliffs above our fly-in camp, we find no rattlers or rabbits within shotgun range. But looking back down as shadows lengthen in the canyon, it's apparent that again our Heli-Home has found a spot few campers have ever seen before. Frank Guilianelle wanted to dictate some notes and stayed down at the helicopter with Cindy. It would be possible to combine a few hours a day of business writing and reading, Frank reported later, but at the magnificent scenic spots the chopper can land mixing work with relaxation could take practice.

Getting out of trouble fast

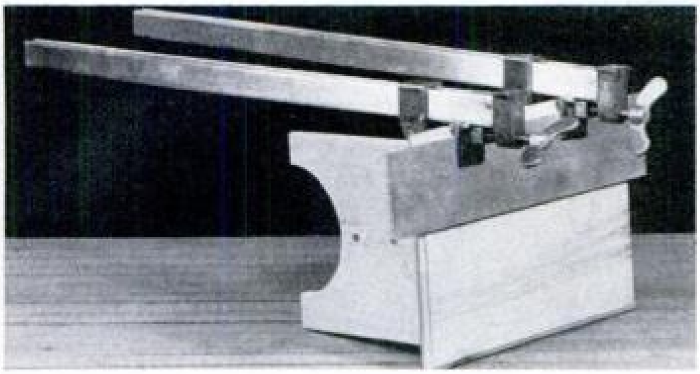
Candles on our dinner table make a warm circle of light, but in the distance we can hear thunder and know how the flash flood from a rain squall can sweep down a wash. Before the rain arrives, we take advantage of more of the Heli-Home's features: no need to camp out if we don't feel like it or when weather threatens. Instead we lift off and in less than an hour are back and tied down at the field in Mesa.

So, besides you and me, who will spend the $300,000 to buy this versatile toy? Oil-well owners, sportsmen's clubs, adventure-loving types with extra cash on hand. A business could probably justify using one to take clients on far-out hunting and fishing trips. Retired owners of $100,000 motor homes could join together to share one. Rental is estimated to run about $10,000 a week, but that might not include the 75 gallons an hour of 100-octane aviation fuel, and you could need a helicopter pilot rating. But what a rig for a party on some far-off tropic isle or a runaway honeymoon!

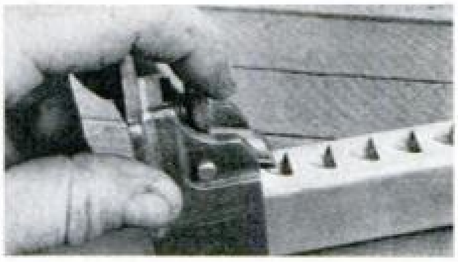
Drawbacks? The open stretches of the West are best for landing anywhere; some eastern farmers might not welcome you unannounced in their pasture. At one desert stretch where we sat down to admire saguaro cactus trees, a state trooper must have gotten a call that a plane went down and drove out to be sure we were nature lovers and not cactus thieves or smugglers. But some day campgrounds may grow used to visitors arriving from the sky. ★★★

Материал, защищенный авторским правом

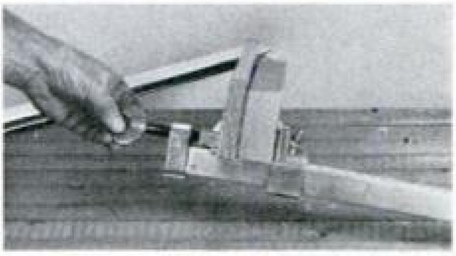
PM TOOL TEST: Quick-set woodworker's clamps



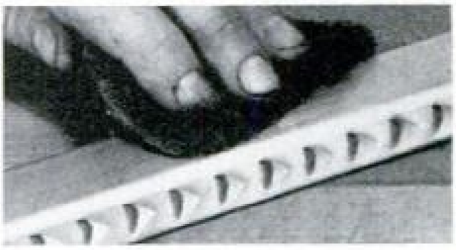
When you think about a clamp, there are really just two areas woodworkers are concerned with—whether the clamp takes a positive hold on the work and whether it's easy to use. If you agree, you will be happy to learn about the latest clamps from Universal Clamp Co., 6905 Cedros Ave., Van Nuys, Calif. 91405. The clamp shown features a shaped aluminum bar which accommodates a threaded head and a sliding tail (that can be moved quickly without a lot of finger busting). Available in 24, 36 and 48-in. lengths at about $10.95, $12.25, and $13.50, respectively, plus postage. I like using them, and plan to keep a pair on hand.—*Harry Wicks, Home and Shop Editor*



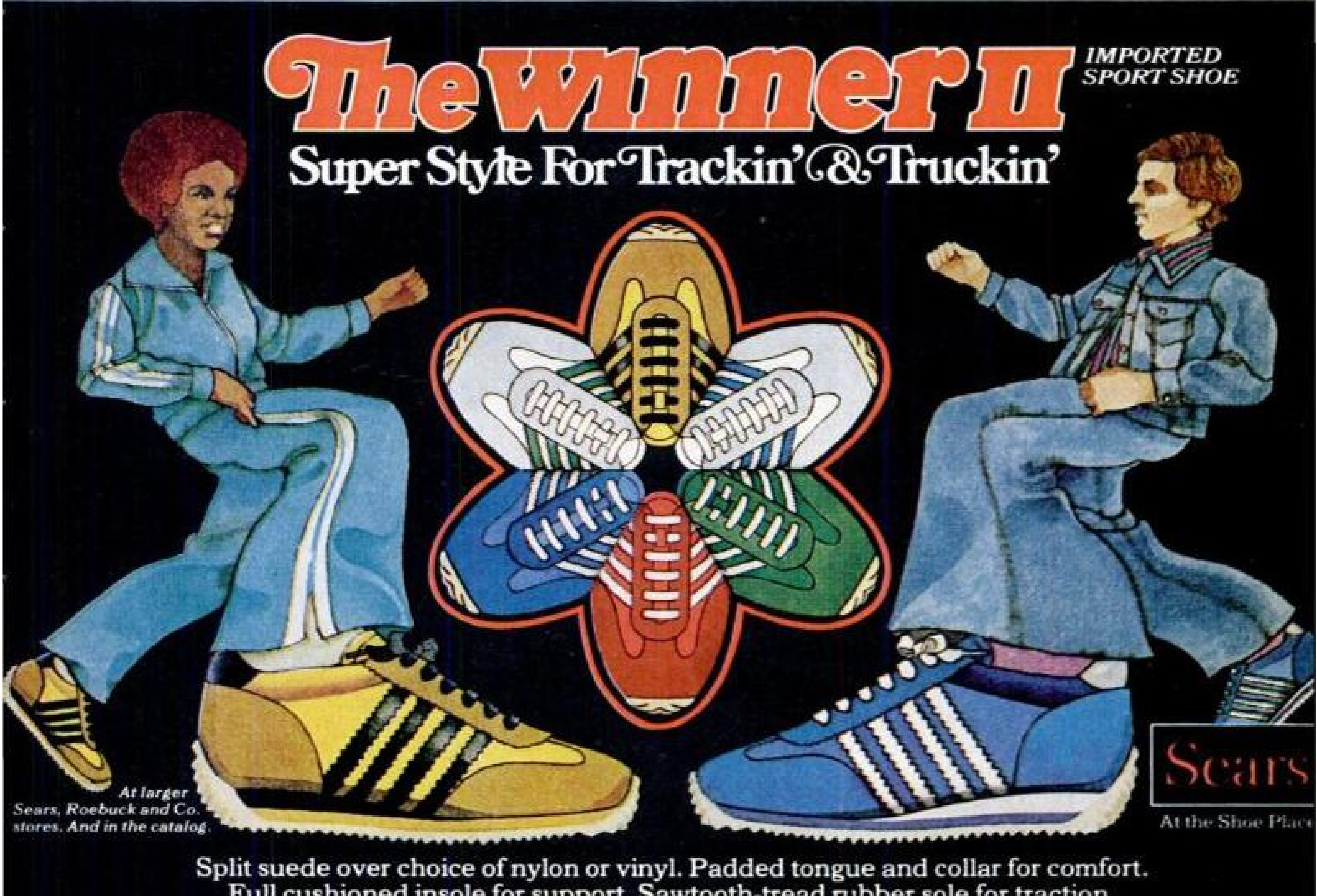
To slide clamp's tail, spring-held device is retracted by pushing in with thumb or index finger. The fitting can then be slid along bar to desired position.



Final tightening is with the wing-shaped screw at headstock. Author found this way to tighten is slightly less convenient than crank-type clamps.



Because they are of aluminum, clamps require little maintenance, no lubrication. An occasional touch-up with 00 steel wool does the job.



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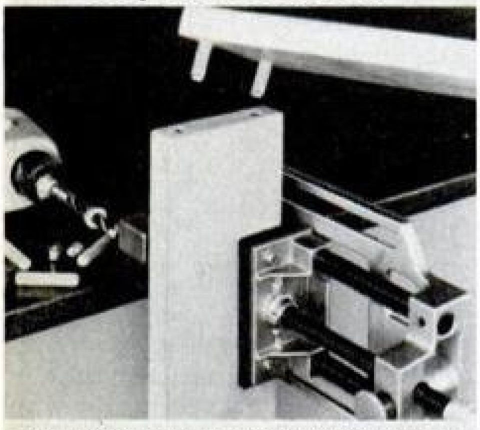

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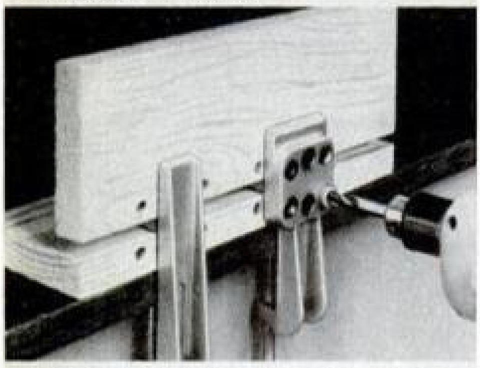

Unique Dowelling Jigs for joining large boards. Two double-gripping clamps — one fitted with three sets of hardened-steel guides: **1/4", 5/16", 3/8"**. Just clamp and drill! • Wherever fine tools are sold.

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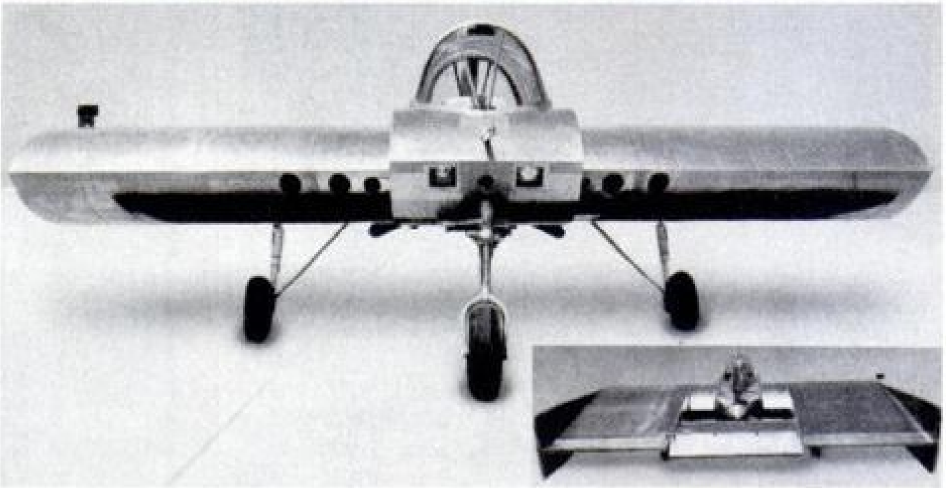

Poor man's lifting body

It took eight years, two models (one cardboard; one a six-foot remote-control job) and 20,000 monel pop rivets to develop and produce the unique plane, above. Its builder, Ralph Sawyer, of Lancaster, Calif., calls it "Sky Jacker II." Wingspan is 18 feet; length is 17.5, and the lift area is 235 sq. ft. A 200-hp Lycoming provides the power, spinning a Hartzell three-bladed prop. The Sky Jacker takes off (and lands) at 55 mph, with a 1500-ft. run. It carries two persons and 50 gallons of fuel. Empty weight is 1600 pounds.

Oil spill blotter cubes

Plastic cube sponges are the Environmental Protection Agency's latest tool for soaking up oil spills. Cubes are blown over spill, blot up oil and are retrieved and run through a wringer. They'll handle 100,000 gallons of oil an hour.

Fingertip pulse-taker

How's your heart ticking? Slip a finger into a sensor wired to a "Pulse-watch" and find out. Electro-optical pickup sends beat signals to a control-box dial (or beeps). $295-$345. Whittaker, 335 Bear Hill Rd., Waltham, Mass. 02154.

Fiberglass gazebo greenhouse

Tricky new greenhouse configuration consists of fiberglass framing members in choice of colors, clear or translucent fiberglass panels, and plexiglass top vent. Door is aluminum with tempered glass. Benches, heat and humidity accessories are optional. Basic unit is $995 plus shipping. Shelter Dynamics, Box 616, Round Rock, Tex. 78664.

Материал, защищенный авторским правом

LCD Watch Breakthrough...

MICRO-ALARM

Beep!

Beep!

a 6-digit 6 function LCD Alarm Watch for only $69.95!

At last, a constant readout (no buttons to push) precision quartz

electronic watch with a built-in 24 hour alarm system.

A quiet revolution has been taking place in the electronic watch industry during the last few years. Push-button LED's are being replaced with continuous-display LCD watches; 4-digit displays are being replaced by 6-digit readouts. This year there will be many such LCD watches available.

However, Winthrop-Rogers prides itself on offering not only the most technologically-perfect products available, but also on introducing the most technologically-advanced products on the electronic market before they are readily available. Therefore, we are pleased to announce the most remarkable achievement in electronic watch technology to-date.

By combining the quartz-accuracy precision of the LCD watch with miniaturized alarm technology, we proudly introduce the first CONTINUOUS DISPLAY ALARM WATCH. A watch that may not be available from other sources for years can now be yours at a price hundreds of dollars less than you would imagine.

And now consider the incredible convenience of a portable alarm clock handsomely adorning your wrist at all times ! ! !

- *Never again missing an appointment because you lost track of time.*
- *Never again missing a plane or a train because you didn't relize how late it had become.*
- *Never again forgetting to make that all-important phone call.*
- *Never having to worry about forgetting to take important medication on time.*
- *Never worrying about waking up from that catnap, or at a hotel if your wake-up call isn't on time.*
- *Always being aware of when you should be coming or going or doing all that your hectic schedule demands – without devoting your valuable time to trying to remember it all.*

7:55AM

SET TO RING AT 7:55 A.M.

THE ALARM

The MICRO-ALARM has a 24 hour Alarm System, allowing you to set your watch to signal at any minute of the day or night (1,440 settings per day are possible). Once set, you need not be concerned about your next appointment or train, plane or phone call. The MICRO-ALARM will remember for you and remind you when you need to be reminded.

SNOOZE/REMIND CONTROL

For your convenience the MICRO-ALARM will give one short beep prior to its full alarm cycle, allowing you to turn it off without disturbing others. If not deactivated after the first short beep, the alarm will then beep for 15 continuous seconds. Push the deactivate button twice and the alarm is off. However, should you want a further reminder, then push the deactivate button only once and the alarm will go through its cycle again in exactly 5 minutes, allowing you to continue your current activity whether it be a snooze or phone call without fear of forgetting your next commitment.

12:34 AND 56 SECONDS

12:34 56

6-DIGIT LCD DISPLAY

The MICRO-ALARM has a 6-digit readout showing hours, minutes and seconds at a glance. Since the readout is by Liquid Crystal Display (LCD) and not by Light Emitting Diode (LED), no button has to be pushed; the time is continuously displayed! A built in night-light functions at the push of a button for reading in darkness.

AUGUST 15th FRIDAY

8:15 FR

CALENDAR DISPLAY

Just one push of the control button converts the display into a 3-function calendar; displaying the month, date of the month, and day of the week. The remarkable memory built into the module knows each month and the number of days in that month and resets automatically on the first day of the new month.

QUARTZ ACCURACY

The MICRO-ALARM is extraordinarily accurate. Its module is manufactured by Hughes Aircraft Company, one of the world's foremost manufacturers of microelectronics, and is guaranteed accurate to within 3 minutes a year (averaging less than 15 seconds per month). You can depend on the accuracy year after year. There are no moving parts, so there is nothing to wear out or even require servicing. The result of this accuracy is that you can set your watch to the second.

THINK ABOUT IT!

Even if you have no consistant need for a watch with a built-in electronic alarm, the MICRO-ALARM is a valuable investment for its watch features alone:

1. It is the most up-to-date fully-functioning electronic watch available today.

2. It is accurate to +/- 15 seconds per month, and never has to be wound – put it on, and the time and date are correct even if it has been in a drawer for a month!

3. Its elegant styling will compliment any attire – and elicit compliments from your associates and friends.

4. At this price you can not find a better buy.

5. One day you will have a critical need to be reminded of a vital appointment – and then, having used the alarm function once, you will never again return to any other reminder system.

6. Why buy an ordinary watch when you can own a MICRO-ALARM?

ELEGANT MESH BRACELET

Each MICRO-ALARM comes with a 1 year limited warranty. You may order in your choice of goldtone or silvertone case. Each for only $69.95 plus $1.99 for shipping and handling. Each MICRO-ALARM comes with a matching, elegant, thin mesh bracelet, more handsome and much more practical than those "pull over-snap" type bracelets. This band adjusts comfortably and easily, eliminating cumbersome link adjustments.

15 DAY TRIAL

Wear the MICRO-ALARM for 15 days to assure yourself that this is no ordinary watch. If at the end of that time you are dissatisfied for any reason you may return it for a prompt refund, no questions asked.

To order by credit card please phone our 24-hour toll-free number:

800-325-6400 ask for Oper. 36

In Missouri: 800-342-6600 ask for Operator 36

or mail the attached coupon with your payment and the MICRO-ALARM will be on its way to you.

Allow 3-4 Weeks For Delivery

Winthrop-Rogers Ltd. V3909

Box A69, 1135 Greenridge Rd., Buffalo Grove, Il 60090

Please send__MICRO-ALARMS @ $69.95 each plus $1.99 for shipping and handling.

_____Silvertone MICRO-ALARM

_____Goldtone MICRO-ALARM

If I am not completely satisfied I may return it for a full refund. Total amount enclosed $_____, check or money order. (Illinois residents please add 5% sales tax.) No C.O.D.s please.

Charge: ☐ Amer. Exp. ☐ Bank Amer./Visa ☐ Master Charge MCBK #__ __ __ __

Card # ________________ Exp. ____

Signature ____________________

Name ____________________

Address ________________ Apt. ____

City __________ State ____ Zip ______

To expediate shipping by UPS, please provide street address rather than P.O. Box number.

developing then for the rest of the GM line. They were getting stubby hoods and those long rear decks with tail fins that gave them an almost rear-engined look. The first Corvette had other distinctive styling features: a deep wraparound windshield, exhaust pipe outlets built into the tail of the car, a convertible top completely concealed under the rear deck when folded, and decidedly non-American bumpers of the most sketchy possible design.

Innovative styling and engineering

Established from the start as a styling pioneer, the Corvette has never relinquished that role. It jumped far ahead of the pack with the Sting Ray model introduced in 1963. This began the modern wide-spread use of hidden headlights, a feature the Sting Ray simply had to have to preserve its unique lines. All Corvettes since have had them. And the tapering fastback design of the Sting Ray coupe was a pacesetter toward more fastbacks in the 1960s.

In 1958, the Corvette was the first American production car to use otherwise wasted space between the dash and transmission tunnel with a console to hold the clock, radio and heater controls. The '58 model also had seat belts as standard.

With its removable roof panels, the 1968 coupe introduced the current T-top roof style, replacing the convertible, and from 1968 through 1972 the Corvette coupe also had a removable rear window. During those same model years the Vette also had windshield wipers that vanished completely under a vacuum-operated cowl panel. And no other American car has matched the modern Corvette's use of body-colored deformable plastic bumpers.

A 'humble' Six

Those bumpers demanded advanced engineering, another area in which the Corvette has always excelled. Though the original '53 car was powered by a humble Chevy Six, it was specially tuned for high power (150 bhp) with three side-draft carburetors. In 1957, Rochester fuel injection was introduced for the Corvette V8 and remained an option through 1965. A fully synchronized four-speed transmission has been available since 1957.

Under the original Corvette chief engineer, Zora Arkus-Duntov, many parts made of aluminum for light weight and better cooling were adopted. Aluminum cylinder heads were offered in 1960 and 1967 through 1969. An aluminum cylinder block

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The new and improved AIR BED™ takes the seasickness, immobility, water and weight out of water beds, but gives you the same relaxed, "give and take," sensation. Two people can sleep on a full or queen size bed virtually undisturbed by the other's movements. This is because **the patented I-Beam construction—with multiple controlled air chambers—supports your body evenly and independently.** You don't sink down and the sides don't fly up as with inexpensive plastic furniture. No frame or innerspring is required, yet your AIR BED™ will fit into any standard bed frame.

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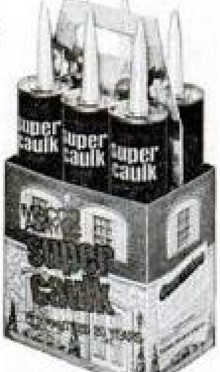

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Sulfodene®

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 (Continued from page 75)

was a 1969 option. Optional in 1960, an aluminum radiator was made standard in 1961. An aluminum transmission housing, for the manual box, came out in 1961. Aluminum wheels were optional, with knock-off hubs from 1963 through 1966, and then in bolt-on form from 1976 until now. In these ways the Corvette demonstrated uses of aluminum years ago that are only now being rediscovered in a newly weight-conscious Detroit.

The list of Corvette engineering advances doesn't stop there. In 1965, it became the first American car, and one of the first in the world, to have a caliper-disc brake system with discs internally vented for cooling at all wheels. On the 1963 model, independent rear suspension was introduced, making the Corvette the only front-engined American car with this advanced feature. The system used, and still used today, was a sophisticated parallel-action design relying on the driveshaft to the wheel as part of the linkage. It greatly improved traction, ride and handling.

The fiberglass body

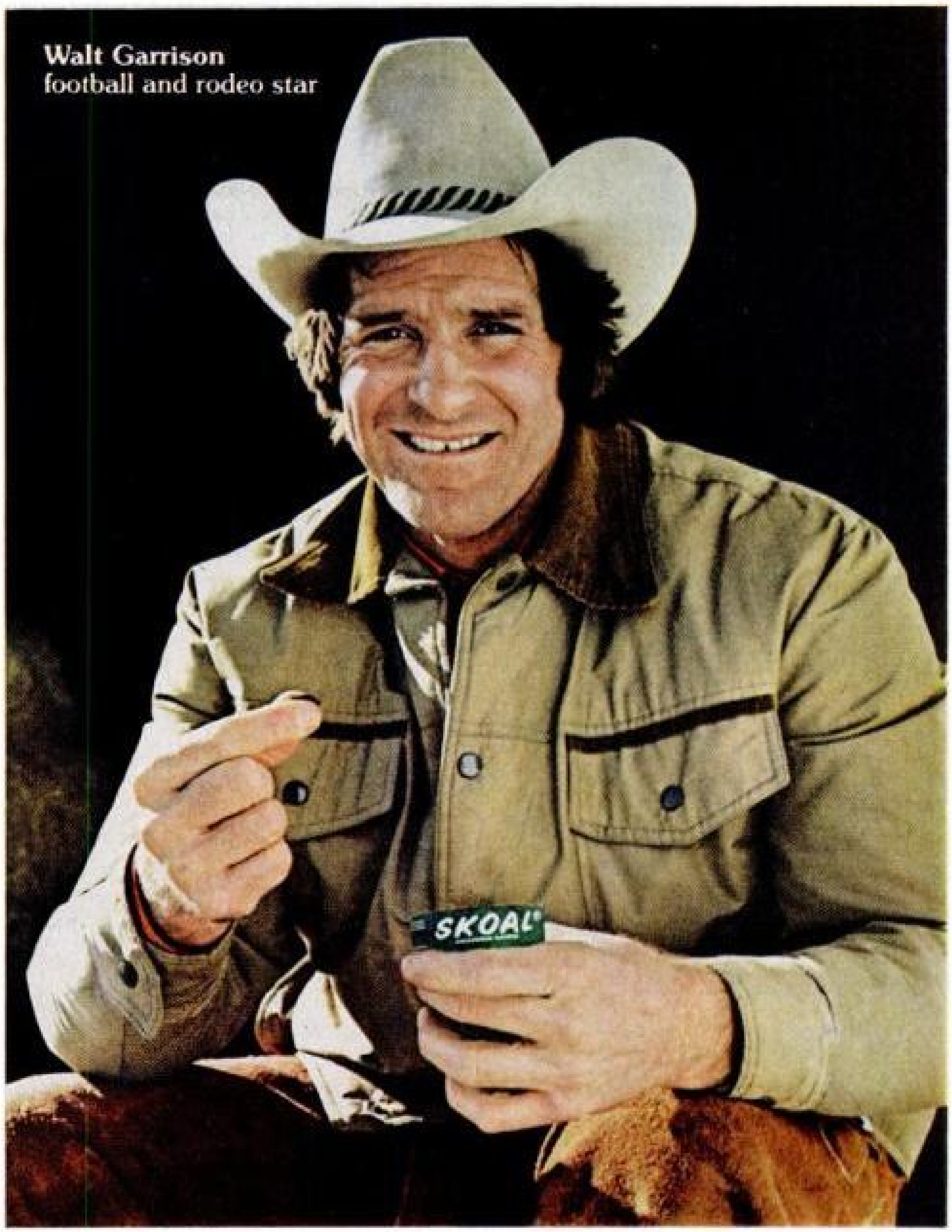
Most innovative of all during the Corvette's lifetime, has been its fiberglass-reinforced plastic body. Oddly, this wasn't the way Chevrolet originally planned it. After making 300 cars in fiberglass in 1953, the plan was to switch to a steel body for the next 10,000. But the Chevy men found the fiberglass worked so well they kept on building them that way.

Each year they learned more about using this unusual material. In the late 1950s, aluminum stiffeners were added to stabilize the cowl and door areas. In the all-new 1963 body a steel "cage" was designed into those parts of the structure, acting also to give roll-over protection in the coupe. In the 1970s, more body parts were shifted to a new process using sheet molding compound (SMC) that promises greater consistency and a better finish. Over these years Corvette owners have made no secret of their liking for the way the fiberglass resists minor bumps and dents and for its absolute immunity to rust. These qualities have kept resale value extremely high.

First seen as a 'dream car'

The first Corvette, named after a type of World War II mini-destroyer, was shown in GM's Motorama exhibit in New York in January 1953. It was one of the "dream cars" then popular as a means of piquing public interest and trying out new styling

(Please turn to page 154)



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If you can't find any of these fine brands at your local store, or if you're interested in just trying a few free pinches, write to; "Smokeless Tobacco," U.S. Tobacco Company, Dept. PM097, Greenwich, Conn. 06830. We'll tell you where to find "Smokeless Tobacco" in your area. And we'll send you a free sample in the mail.

Smokeless tobacco. A pinch is all it takes.

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Have you ever thought of operating a little mail order business of your own? Something you could start on a shoestring right from home in your spare time. It's a fabulous business!

Bob Carter of Newark, N.J. ran his first small mail order ad in House Beautiful magazine — offering an auto clothes rack. Business Week reported that his ad brought in $5,000 in orders. By the end of his first year in Mail Order, he had grossed over $100,000!

Another beginner — a lawyer from the mid-west, sold a mail order item to fishermen. Specialty Salesman magazine reveals, "he made $70,000 the first three months!"

There is no other business where you can make a fortune so fast. Come up with a 'hot' new item . . . and WHAM!

It strikes like a bolt of lightning!

Millions of people read your ad and suddenly, you are swamped with cash orders from all over the country . . . MORE MONEY in 60 days than you could earn in a lifetime!

Like the Vermont dealer who ran one ad in Sports Afield magazine. His ad pulled 22,000 orders — over A HALF MILLION DOLLARS IN CASH!

Yes, Mail Order is the fastest-growing, most profitable business in America! And now with the population explosion . . . the huge teenage market . . . and more people moving to the suburbs — we are on the verge of the BIGGEST BOOM in Mail Order history!

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If you are sincerely interested in starting a lucrative business of your own ACT NOW! We can help you get rich in Mail Order just as we've helped others. Mail the coupon or send a postcard. We'll send you a free book, catalog, ads and complete facts about our offer. No salesman will call. No obligation. You don't need previous experience but you must be over 21. Write to:
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 (Continued from page 153)

and engineering ideas. Dream cars and experimental cars played an important role in the Corvette drama.

The reshaped tail of the XP-700 dream Corvette of 1958 previewed the production change made in 1961. The much-changed 1963 model had two important experimental-car predecessors: the 1959 Sting Ray racing car of Bill Mitchell, for styling, and the 1960 CERV II single-seater of Zora Arkus-Duntov, for independent rear suspension. The beautiful Mako Shark II of 1966 set the pattern for styling the 1968 model Corvette. And it seems likely that some styling of the sleek Aero-Vette, first seen as the experimental 4-Rotor of 1973, will spark the looks of future Corvettes.

The racing record

Some experimental Corvettes, like the 1957 SS and 1959 Sting Ray, have been out-and-out racing cars. Active participation in 1956 and 1957 racing had everything to do with the respect the Corvette gained in skeptical sports car circles. In 1956, five Corvettes—four of them factory-prepared—started the Sebring 12-hour race, and all but two soldiered through to the finish. That same year Dr. Dick Thompson won the Sports Car Club of America's Class C Production Championship, beating Jaguars and Mercedes-Benz. That left little doubt the Corvette had what it took to be rated a bona fide sports car.

Since then, sports car racing in America has never been without a generous supply of Corvettes. The fiberglass flyer was the SCCA's Class A Production Champion in 1962, 1969 through 1972, and 1974 through 1976. In Class B Production the Corvette has come out on top 15 times since 1957. Also to Corvette's credit are six GT category victories at Sebring and five GT triumphs at Daytona. In long-distance races overseas, Corvette's best showing was eighth overall at Le Mans in 1960.

A new, 1981 Corvette?

The first Corvettes of 1953 and '54, offered only with side curtains and automatic transmissions, were a drug on the market. Nobody seemed to want this Chevrolet idea of a sports car. But with the arrival in 1956 of roll-up windows, manual shifts and racing achievements that gave the ad copywriters a way to dramatize what the Corvette could do, sales perked up. Soon the Corvette started earning a solid profit for GM. At its present combination of high prices and excellent sales, Corvette is more profitable than ever.

For the many Corvette fans who like today's model but would be even more pleased to see a sensational new Vette on the highways, the present popularity is not good news. Top GM managers have made it clear repeatedly they can't see any reason why a radically changed Corvette is needed as long as the current model, with facelifts, keeps selling better every year. "The future depends on several things," says Zora Arkus-Duntov, now retired from Chevrolet. "If sales stay strong, the car will remain the same. If they go down, one of two things will happen: The Corvette will be dropped, or a new one will be built."

Corvette's crystal ball is clouded more by the present uncertainty over the engines GM will build in the future. Fuel economy needs will make V6 engines the norm in the 1980s. "I don't even know if a V8 engine will be available to us," says Dave McLellan. "We may still be making a V8 for trucks then." If GM were to drop its passenger-car V8s after 1984, as seems likely, an all-new smaller, lighter Corvette would be needed to suit a less powerful V6. This could have a conventional drive train or a mid-engine location, using the transaxle being developed for GM's front-drive compacts, set for a 1980 debut. But no such Corvette is being engineered yet.

It's much more likely the present Corvette chassis will get a new body design as soon as it's clear the chassis will be marketable into the 1980s. This could be ready for the 1981 model, and could have the stunning good looks of the Aero-Vette, without that car's rear engine. There'd be several reasons for the change. One would be to provide a roomier interior in what is, after all, a rather large sports car. Another would be to tool the body using the latest advances in SMC plastics, advances that can't be exploited piecemeal in the present body. Still another would be to improve the shape's aerodynamics so Corvette would give the best possible mileage.

Would it really be worth it? Unless prices go up too far, the new 1978 fastback is sure to get new all-time highs for Corvette production and sales. That won't be much argument for a major change. Buyers of recent Corvettes told Chevrolet they feel their cars are "advanced" and "futuristic" in styling. When you look at that long-nosed beauty, with a shape that still turns heads on any road, you must admit they're right. At 25, the Corvette magic stays mighty strong. ★★★

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BE A LOCKSMITH

JOHN KOLIELNIK
(Los Angeles, Cal.)
"Now that I'm a locksmith, I've increased my salary by at least $175 a week. Even earned $550 before completing the course! I think the Locksmithing Institute is the best!"

HARRY PROVART, JR.
(Duquoin, Ill.)
"Locksmithing Institute has the best course that money can buy, and my instructor was tops. Earned $200 while training . . . since then I've earned $350 spare time."

IDEAL F. BALDONI II
(Riviera Beach, Fla.)
"Enrolled because I eventually want to be self-employed. As a result of my training, I've assumed locksmith jobs my company formerly hired outside people to perform."

TRAIN AT HOME—EARN WHILE YOU LEARN

Add to YOUR INCOME—even double it with easy spare-time earnings. Cash in on the nationwide shortage that demands hundreds more trained locksmiths. Quickly step into a big pay opportunity, full- or part-time job or start a high-profit shop of your own! Even earn as you learn.

EARN EXTRA MONEY RIGHT AWAY!

You can quickly qualify as a skilled locksmith. Age, education, even minor physical handicaps don't matter in this ever-growing trade. So easy to learn—it's easy, it's fun, it's just like a fascinating new hobby!

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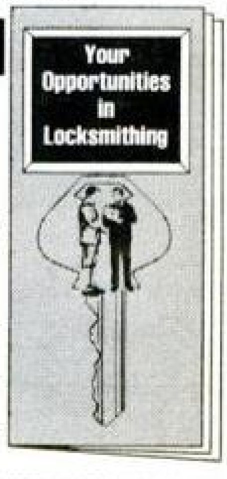

 (Continued from page 111)

Handling came in for ample praise, a Wisconsin collegian stating: "The car handles real great on the road; hugs corners and yet gives solid riding comfort."

An Illinois high-school secretary: "Handles wonderfully in tight spots and is easy to park." A Texas draftsman: "Handling and ride equal to that of our de Villes. Rack-and-pinion power steering is a real plus."

The Mustang II's workmanship received high praise generally, with 65 percent of our respondents rating it *good to excellent.* "A solid car," says a California airport manager, "and everything seems to fit well."

A South Carolina teacher agrees: "Excellent quality—upholstery is well stitched, doors are solid."

And a New Mexico marine dealer: "Workmanship on the actual car is good, but the Cobra kit quality is poor. I find misfits, and the tape is peeling."

We always ask owners to list the items they'd like to see changed.

The crowded engine compartment discourages do-it-yourself repairs.

Their answers give good clues to the way they feel. As for Mustang II, 17 percent of the owners said they'd like no changes at all: "Leave the car as it is." A number of other owners suggested these improvements.

"It'd be a lot better car with a deeper trunk," says a New York sales manager. "The coupe's other dimensions are adequate, but the trunk is much too shallow."

"Power steering should be standard," recommends a Nebraska adman, "because the Mustang's rack-and-pinion without power is too stiff for the average woman to handle."

A Florida apartment manager: "I think they ought to offer more optional accessories, like cruise control, power windows, reclining seats, etc."

A Wisconsin teacher: "Better door-mounted radio speakers. Stock ones can't handle base responses very well. Also get rid of the spare-tire hump in the trunk, and put the rear-seat fold-down release on the driver's side of the car."

An Iowa biologist: "Improve the front suspension for better handling and control with less sway in sharp turns." A California businessman: "The 302 V8 tends to be noisy. I think they could insulate the car better; also drop the axle ratio for better gas mileage."

"I'd like to see the V8 made available with a four-speed gear-

Aircommand 40-channel CB..

From the people who bring you Marantz—the world's finest stereo systems—comes the Aircommand CB-640—the finest in 40-channel CB. With Aircommand you get over 25 years experience in outstanding 2-way communications products.

Full 6 Watts of audio power. Provides plenty of punch so your speaker cuts through freeway noise.

Dual-conversion superheterodyne receiver with dual-cascaded ceramic filters. Together, both features provide the most complete rejection of unwanted signals, assuring you unsurpassed selectivity and sensitivity.

4 big Watts of RF power. Aircommand delivers the maximum power legally allowable to let you belt out the big sound.

100% modulation capability. Even when you talk softly into the mike, your message cuts through loud and clear, thanks to one of the most advanced mike preamp and compressor designs in CB today. With Aircommand, you don't have to spend an extra $30 to $40 on a "power mike." You can't buy better modulation than Aircommand.

Specially tailored frequency response.

LED 40-channel selection display. Easy-to-read, night or day.

8-LED (light emitting diode) meter display. Provides an easy-to-read display of SWR (standing wave ratio), modulation, and incoming or outgoing signal strength—instantly, accurately.

Special emergency Channel 9 scan with exclusive Aircommand "beep" alert. No matter what channel you're on, a special Aircommand CB-640 circuit continuously and silently monitors Emergency Channel 9. When someone starts transmitting on Channel 9, a unique "beep" alerts you, so you can tune yourself in and give assistance.

Public address capability. The versatile Aircommand CB-640 public address package lets you (1.) Talk into the CB mike and out an exterior public address speaker. (2.) Attach a tape recorder to the auxiliary jack on the

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box and without having to order power steering and brakes," is the suggestion of a North Carolina trucker.

Ford dealers ended up with a lower-than-average rating in service on the Mustang II, 22.2 percent of our owners giving them a rating of *average* and only 52.1 percent judging service *good* to *excellent*. That's below most cars we surveyed for 1977.

Another below-average response came to our question, "Would you buy another Mustang II next time?" Fully 43.7 percent of these answers were negative.

Even so, we must keep in mind that this "no" doesn't lie so much with the car itself as the fact that owners are young (58 percent under age 30) and that most of them will need more room in their next car.

★★★

SUMMARY OF 1977 MUSTANG II OWNERS REPORTS*

Total miles driven	**1,180,110**
Average miles per gallon	
2.3-liter ohc Four	
In town (EPA 23 manual)	19.2
Long trips (EPA 33 manual)	23.7
2.8-liter V6	
In town (EPA 17 autom.)	18.4
Long trips (EPA 23 autom.)	21.9
302-cu.-in. V8	
In town (EPA 17 autom.)	14.0
Long trips (EPA 22 autom.)	17.8
Engine choices:	
2.3-liter (140 c.i.d.) Four	42.6%
2.8-liter (171 c.i.d.) V6	19.0
302-cu.-in. V8	38.4
Transmission choices:	
Automatic	58.0%
Four-speed manual	42.0
Body style choices:	
Two-door hardtop	65.8%
Three-door fastback	34.2
Why did you choose the Mustang II?	
Styling	60.3%
Economy	33.5
Size	30.1
Past experience	11.3
Handling	10.9
Specific likes:	
Styling	54.8%
Handling	54.4
Economy	28.5
Comfort	20.6
Size	13.6
Specific dislikes:	
Poor gas mileage	21.7%
Rattles and noises	9.3
Not enough trunk space	8.8
Not enough power	8.0
What changes would you like?	
Better gas mileage	12.9%
More trunk space	11.2
Different seat style/ recliners	9.8
More legroom	6.7
Workmanship opinion:	
Excellent	22.6%
Good	42.4
Average	21.8
Fair	8.6
Poor	4.5
Comfort opinion (front seat):	
Excellent	34.7%
Very good	36.4
Good	19.4
Fair	6.6
Poor	2.9
Comfort opinion (rear seat):	
Excellent	5.2%
Very good	10.5
Good	19.2
Fair	27.9
Poor	37.1
Had any mechanical trouble?	
Yes	54.7%
No	45.2
What type of trouble?	
Carburetor	34.8%
Oil leaks	6.8
Cold starts	6.1
Transmission	4.5
Brakes	4.5
Did you fix it yourself?	
No	95.5%
Yes	4.5
Dealer repairs satisfactory?	
Yes	57.0%
No	43.0
Dealer service opinion:	
Excellent	21.3%
Good	30.8
Average	22.2
Fair	11.8
Poor	14.0
Number of vehicles owned:	
Mustang II only	44.7%
Two cars	37.3
Three cars	12.3
Four cars	3.7
Five or more cars	2.0
Makes of other cars owned:	
Ford	56.3%
Chevrolet	18.5
Cadillac	7.4
Oldsmobile	6.7
Age distribution of owners:	
15-29 years	57.0%
30-49 years	27.1
50-plus	15.7
Would you buy another Mustang II?	
Yes	56.3%
No	43.7

*Percentages might not equal 100% due to rounding or insufficient data.

..You never heard it so good!!!

CB-640 rear panel, and boom your tape out through the same external speaker. (3.) Mix your voice from the CB microphone with the program material on the tape recorder. Both voice and tape sound at the same time through the external speaker. (4.) Beam your **received signal** through the external speaker.

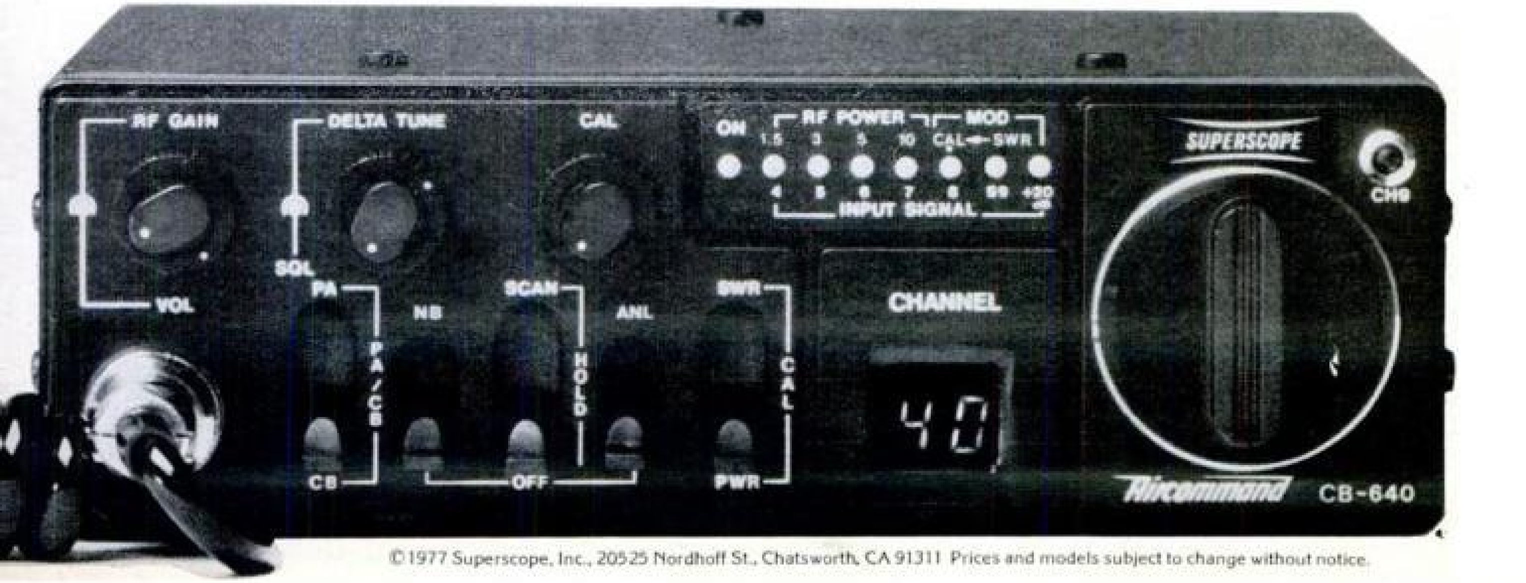
Built-in standing wave ratio circuitry. Measures the efficiency of the antenna system for optimum performance.

Other outstanding features include: Delta fine tuning control, digital synthesizer with phase-locked loop, automatic noise limiting switch, noise blanking switch, squelch control, RF gain control.

Also available: Aircommand CB-140; Aircommand CB-340. All 3 units bring you state-of-art design, flawless craftsmanship and day-in, day-out reliability. Try them out now at your Superscope Aircommand dealer.

TM Aircommand by SUPERSCOPE.

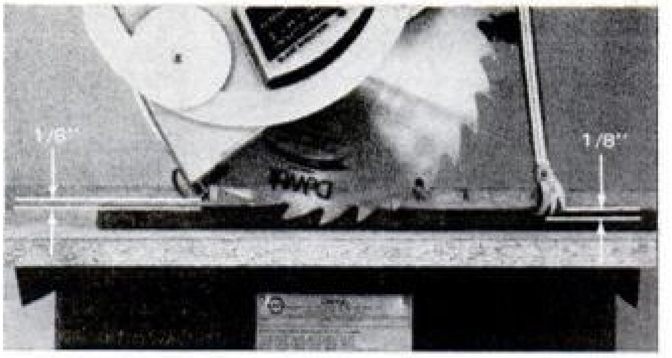
Selected for use by the California highway patrol.



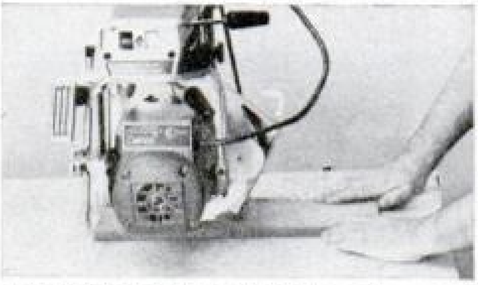
©1977 Superscope, Inc., 20525 Nordhoff St., Chatsworth, CA 91311 Prices and models subject to change without notice.

BASIC CUTTING WITH A RADIAL-ARM SAW

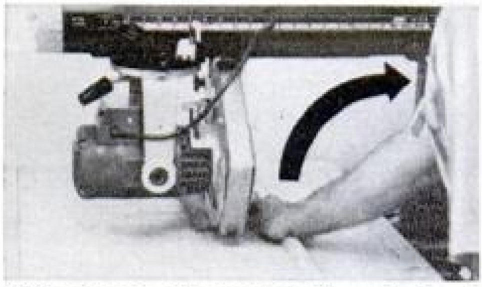
(Continued from page 114)



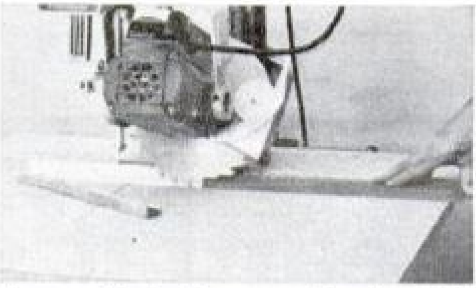
The blade guard is set the same whether making an in or out rip. The guard front is set ⅛ in. above workpiece surface, antikickback fingertips ⅛ in. below. Though we have held guard up in several pictures for photo clarity, make certain you *always use guard correctly* as shown.



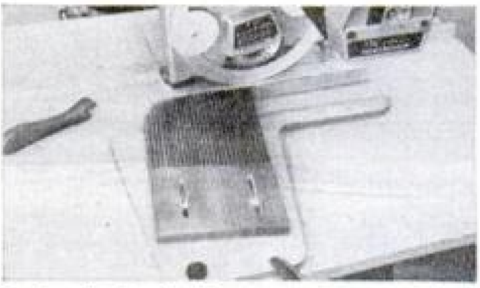
Use left hand to hold lumber down and against fence, and right hand to push it.



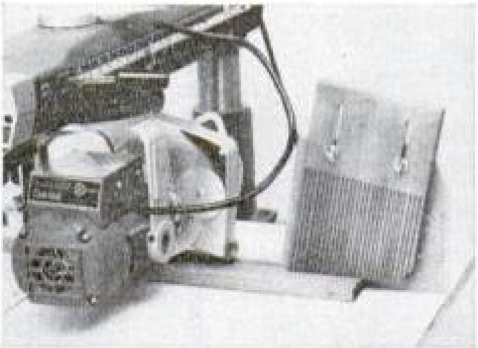
Wide pieces are pushed through; hand follows arrow's path after completing cut.



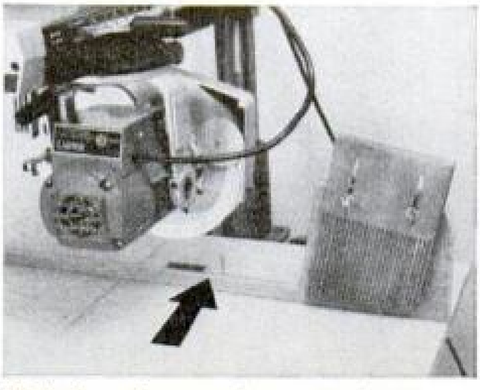
To complete ripping narrow board, push it fully through blade using a second stick.



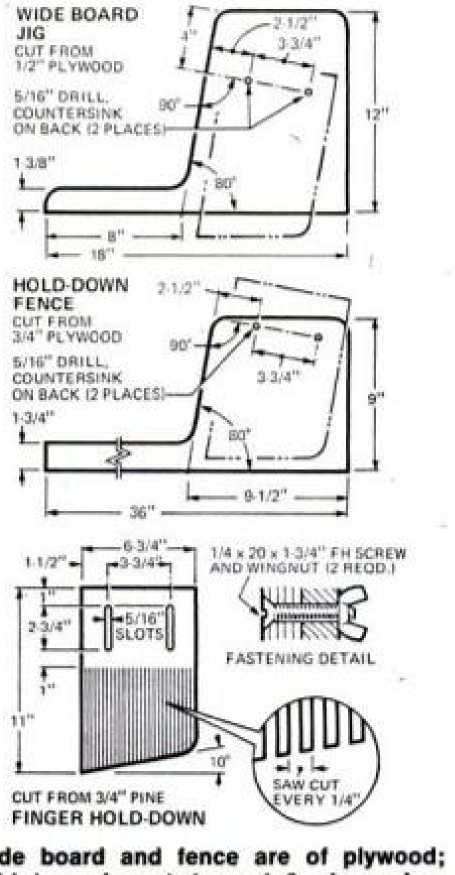
Spring device holds narrow pieces against fence—just before work enters blade.



By changing the board it's attached to, finger device can be used as a hold-down.



Hold-down fence replaces standard fence (arrow); its configuration can be altered.



Wide board and fence are of plywood; hold-down is cut from 1x8 clear pine.

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that there is no end play in the arm and that the roller head fits snugly in its tracks. These adjustments vary from one brand to another but manufacturers include instructions for them in their owner's manuals.

Finally, perhaps the single most important adjustment is to see that your blade cuts in a line. Called kerf adjustment, this means making certain that the rear of the blade is directly behind the front of the blade. If it isn't, crosscuts will not be square and safe ripping will be impossible. Refer to your manual for making kerf adjustment and then check out your saw blade.

Important: Before making any saw adjustments, always be sure to disconnect plug from power source.

Know your blades

Though you can keep a combination blade on your saw most of the time for general shopwork, be aware that certain blades are best on jobs for which they are designed. For example, since ripping requires roughly four to five times the power that crosscutting does, it makes sense to use a rip blade with its chisel-like teeth when you have a lot of cutting to do. Conversely, a hollow-ground planer blade makes a very smooth cut and is excellent for making crosscuts in lumber that will end up as parts on a fine piece of furniture.

Give thought to purchasing a carbide-tipped blade—it can go without sharpening considerably longer than a conventional blade. For more about these, see *Carbide Blades—Performance at a Price* (page 59, May '77).

Basic radial saw cuts

Basic cuts include crosscut, rip, miter, bevel and compound. Some craftsmen may argue that chamfer cutting should be included, but for my money this is an advanced cut. Here's a brief description of the five cuts mentioned:

■ Crosscut is across the grain of the wood. The wood is held at a 90° angle to both fence and tabletop and the blade is drawn across.

■ Rip is a cut made with the grain of the lumber. For ripping on a radial saw, you turn the saw motor 90° and feed the work into the spinning blade. Direction of feed is important whether you work with the saw in the in-rip (blade between motor and post) or out-rip (position reversed). *Always* make certain that the antikickback device is used as it is supposed to be (see photo page 160), and use a pusher to cut any board narrower than 3½-in.

■ A miter cut is one that is at an angle to the length of the workpiece (i.e., 90° is a crosscut, 45° is a miter cut). The blade stays at 90° to the table for miter cuts.

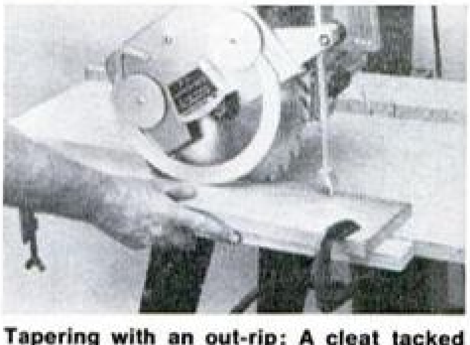
■ Bevel cutting is done with the blade tilted at an angle to the workpiece surface and can be either a crosscut or a rip.

■ A compound cut is the execution of both the miter and bevel at the same time (see photo page 114).

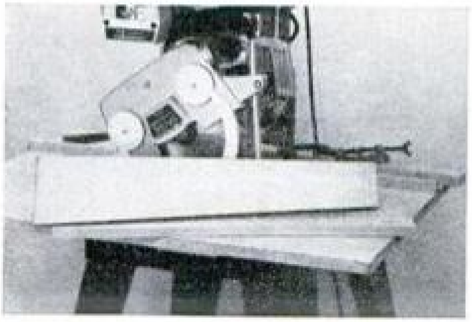
All basic cuts are shown in the photos. For clarity, in several photos the guard has been lifted or moved. *In use, never run your saw without blade guard and antikickback device in correct position.* ★★★

To make taper cut, board can be tacked to a square piece which rides the fence.

Taper line is lined up over edge of jig (board) to which it is attached.



Tapering with an out-rip: A cleat tacked to workpiece rides the top's edge.



Completed taper is neat, accurate. Use a combination blade, slow feed rate.

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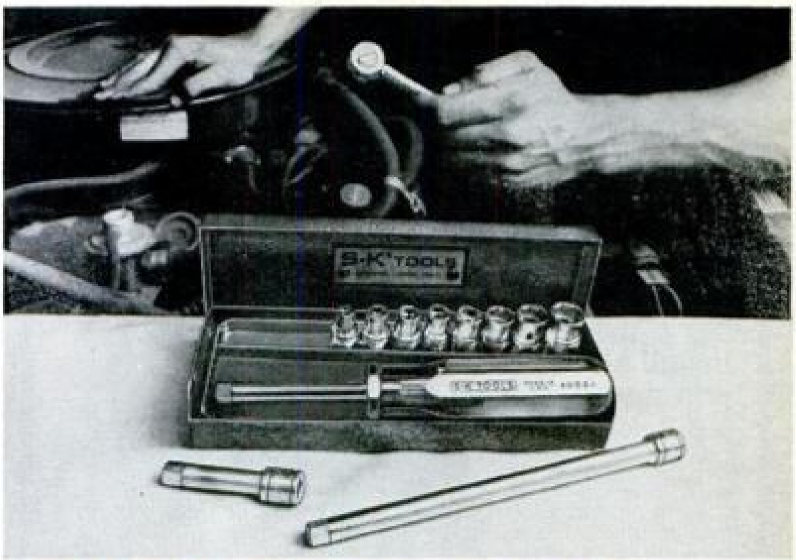
SAVE $30.53 OVER 51%*

20 pc. ⅜ in. drive Socket Set with S-K ratchet & metal box. No. 4520-77. This top notch set's a winner when you're tackling jobs like garden tractors, cars, or outboard motors. Total value if purchased separately $59.41.

$28.88 Suggested User Price



SAVE $13.06 OVER 43%*

13 pc. ¼ in. drive Socket Set with S-K ratchet & metal box. No. 4913-77. Tight squeezes. This set pulls you through whether you're fixing a car, washing machine, or small appliance. Total value if purchased separately $30.04.

$16.98 Suggested User Price

SAVE $11.29 OVER 34%*

5 pc. ⅜ in. drive Tune-Up Set in vinyl pouch. No. 4505-77. Talk about handy! This set performs many common car tasks like spark plug replacements. Bent handle flex head ratchet makes close quarters accessible. Total value if purchased separately $32.88.

$21.59 Suggested User Price

SAVE $8.69 OVER 47%*

5 pc. Combination Wrench Set in vinyl pouch. No. 1705-77. Great assortment lets you take on almost any job from motorcycles to power mowers and come away smiling. Total value if purchased separately $18.28.

$9.59 Suggested User Price

ONLY $13.69 No. 76015-77 Torque Wrench**
Professional quality. 0-150 ft. lbs. capacity. Dual English/metric scale. Compare with other torque prices.

*All savings based on piece by piece purchase at suggested user prices.
**Based on suggested user prices.

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FULL LIFETIME WARRANTY

SATISFACTION GUARANTEED. If you, the consumer, are not completely satisfied with any tool in any S-K set, simply notify the place of purchase for a free replacement during the life of the tool.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

S-K DRESSER

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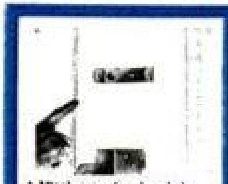
1 Attach mounting bracket

2 Attach power unit to ceiling

3 Mount door arm

4 Connect radio receiver

5 Installation's complete

6 Genie's ready to enjoy

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HOW TO CORNER LIKE A PRO

(Continued from page 89)

a curve as far as possible to spot oncoming traffic or dangerous surface conditions.

Setting up for a curve

Take, for instance, a right-hand curve. Make your approach from the left portion of your lane or side of the road. As you track through the turn, gradually drift toward the right lane. By coming out of the corner near the shoulder side of your lane, you provide "escape space" between you and the other lane, in case an oncoming vehicle crowds your side of the road.

For a left turn, make your entry from the right or shoulder side of your lane. To widen the turn as much as possible, you'll come out near the shoulder side. However, depending on the curve, surface conditions, and your speed, you may want to make the exit near the center of the road. This way you have a little maneuvering room toward the shoulder side in case centrifugal force pulls you more than you had anticipated.

Always be alert for poor surface conditions or off-camber curves that may necessitate deviating from your path somewhat.

Spend as little time as possible in the center area of your lane, too. Why? Oil drippings from other vehicles will accumulate there, especially on uphill curves.

Preventing pavement rash

And what would you do if you entered a curve too fast and started skidding?

If the front tire slides out first, there's practically no chance for recovery. About all you can do is roll up into a ball—and hope for the best.

Tuck your head down, and draw in your arms. Bring your knees up to your chest. Flailing arms and legs stand a better chance of being broken.

Because you don't have time to think, making yourself compact must become a subconscious or reflexive action. Visualize how you'd do it. Even practice it physically by drawing yourself up and rolling around on the ground.

Once you've programmed your mind on how you'd react during a spill, your body will react accordingly —should a spill situation ever occur.

Now if the rear tire should slide out first, you have some chance of recovery.

Here's where you get a taste of racing by "hot-shoeing" your bike around a turn. First, try to resist snapping the throttle shut. This action is about the same as hitting the brake. The sudden transition from power-on to power-off could send the rear end sliding out of control altogether.

With your turn-side foot down for support, cock the front wheel slightly toward the outside of the turn. Hopefully you'll have the necessary heavy-soled footwear a cyclist needs. And hang onto that handlebar.

If you're lucky you'll come out of the skid. As you get the bike under control, ease on the gas as it straightens up coming out of the curve.

Should the bike lie over too far on its side, you're better off trying to keep it down rather than let it back up. Trying to bring it back up could result in the motorcycle "sling-shotting" you right over the handlebar.

Practice and learn to corner like a pro. It beats picking gravel out of your teeth. ★★★

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NEW FROM NRI

Small Engine Repair Course from the leading technical home training school

More than 50 Million Engines Mean Unlimited Opportunities for Part-Time or Full-Time Income.

Every lawn mower, chain saw, garden tractor or other machine powered by a small engine represents a potential need for professional service and maintenance. NRI can give you the training you need to cash in on this opportunity . . . at home and in your spare time. You get the tools you need to troubleshoot and maintain two-cycle, four-cycle, diesel, outboard, air and water-cooled engines.

Only NRI supplies you with an Engine Component Kit designed for training.

Hands-on experience comes quickly with the NRI Small Engine Repair Course. Along with the bite-size lessons fully illustrated, you receive all the components of a versatile 3½ HP Clinton Engine. Using NRI Power-On training principles, you assemble the complete engine, to use in your workshop or to install at a profit on one of your first jobs.

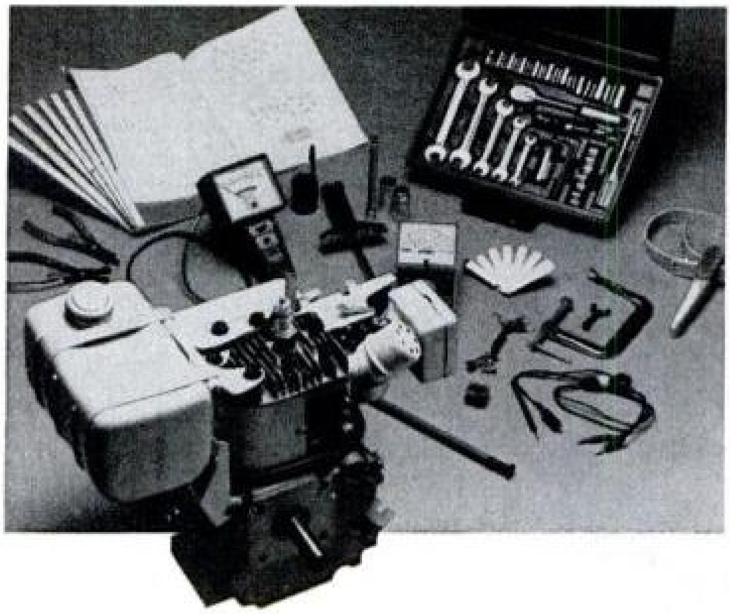
Where other courses give you inexpensive hand tools, NRI includes with its training an *inductive tachometer, professional volt ohm meter, torque wrench, valve spring compressors, ring compressors, and all the wrenches and specialized tools you need to start your own repair shop.*

Two courses available

The 30-lesson Basic Repair Course covers the theory and practice of small engine operation and repair, including lubrication, ignition, cooling and starting systems. You specialize in professional lawn mower and other lawn-and-garden equipment repairs. You learn in depth . . . with up to 10 times as much information provided as in competitive courses.

With NRI's 45-lesson Master Repair Course, you move into more advanced training. Lessons cover chain saws, minibikes, mopeds, outboard engines, snowmobiles, golf carts, all-terrain vehicles, welders, generator sets, and other industrial equipment . . . plus six lessons on motorcycle repairs.

You learn the specific engine requirements for power take-offs, charging systems, electrical systems, etc. Practical working knowledge of clutches, torque converters, transmissions, and other drive train parts gives you the professional's edge.



You get more training and more equipment for your money with NRI.

NRI is the unquestioned leader in technical home training, with more than a million students in its over six decades of instructional service. The oldest and largest school of its kind in the country, NRI offers you expert help every step of the way. You'll move ahead at your own speed, earning as you learn, with small engine repairs for your family, friends, and neighbors.

Send for the free catalog and discover how big your future can be in small engines. No salesman will call. If the coupon has been removed, write to: NRI Small Engine School, 3939 Wisconsin, Washington, D.C. 20016.

NRI SCHOOLS
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Washington, D.C. 20016

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It strips wire without damaging the conductor. Cuts machine bolts without damaging threads. Cuts wire with a clean, scissors action. Crimps both insulated and non-insulated wire to make permanent, solderless connections. Its lean plier-nose pulls wire, loops wire ends, loosens and tightens small nuts. Blue dipped plastic cushion grips are kind to hands. Tough, durable, precision made to CHANNELLOCK standards. Length 8¼ inches.

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No. 908—G WIRE TOOL
Meet The Family • Send For Free Catalog.

HOW BIG IS 12 METERS OF BOAT?

(Continued from page 77)

boat down—such as a large wetted surface. The designer can't go too far in any one direction.

The formula that tells what a 12-meter is, may look straightforward:

$$R = \frac{L + 2d - F + \sqrt{S}}{2.37}$$

R = rating, in meters; L = length, in meters; *d* = girth difference, in meters; F = free-board, in meters; S = sail area, in square meters; 2.37 = a mathematical constant that is divided into the figures above.

But that length isn't the overall length or the load waterline length —measurements shown in normal descriptions of yachts. Instead, it's a combination factor starting with a length measurement at a point 1.5 percent of the class rating (12) above that load waterline: Girth measurements around the hull at the ends of this line develop factors which are added to the length.

Girth for *d* in the formula is measured at .55 along the load waterline. It's the sum of the differences between skin (surface) girth and chain (measuring line stretched to bridge concave curves) girth, from marks above and below waterline.

Freeboard (height of deck above water) measured at fore, center and aft girth measurement points, must meet certain rule specifications. The sum is divided by three.

Sail area is rated area of the mainsail plus foretriangle ahead of the mast. The mainsail is mast times boom lengths divided by two; the foredecksail area is also multiplied by .85.

If all of your measurements add up to 12 meters in the formula, have you designed a 12? You've started, but among many more specifications are recent ones allowing current models to be constructed of aluminum and keeping 10 of the 11 crew members in cockpits up on deck. No longer do winch grinders and line tailers hide in the hold.

Maximum cockpit dimensions are even specified, as are proper curve of the decks, maximum depth of keel in the water, size of spinnaker sails and sail battens to help fabric hold its shape. Even construction methods must meet Lloyd's Register of Shipping specifications.

Rules still permit enough variation so that some America's Cup contests have been mismatches with one hull considerably faster than another. This year, when one American boat meets a challenger from Australia, Sweden or France, we'll see if any architect has used the complicated formula for a breakthrough in yacht design. ★★★

When you join the Coast Guard you don't have to kiss everything goodbye.

Do I have to give up my car? Do I have to wear a uniform all the time? Do I have to get a short haircut and sleep in barracks? What about my social life?

If these are the kinds of questions that pop into your mind when you see an ad for the Coast Guard, we'd love to answer them.

To begin with, during your first nine weeks the answer to those questions is yes. Because those nine weeks are called basic training. Every service has it.

It's a period of time we feel is necessary for you to get to know us, and vice versa. After it's over you'll go on to advanced training, either on the job or at a school. Then things start to change. And you'll begin to see the Coast Guard as it really is. You'll work hard at things like search and rescue patrols, fighting pollution and enforcing the law on the sea. All important jobs.

But when your job is done and you're off duty, your time is your own. You can get out of your uniform and into your own interests which you just might enjoy more than you do now. Because every job in the Coast Guard comes with a paycheck (over $400 a month right after basic training). Most of which is yours to keep, because of the living allowances and benefits we provide.

And the better you do your job and earn advancement, the bigger that paycheck will get. Which means the Coast Guard is a place to start building a future.

It all adds up to a pretty unique job with a pretty unique lifestyle. And that's one of the reasons the Petty Officer in the picture is smiling.

See your local recruiter, or send us the coupon below for more information.

Coast Guard Opportunities 56097
P.O. Box 1452, Scranton, Pa. 18501

Please send me more information about the following Coast Guard Programs:
☐ Regular enlisted
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☐ Coast Guard Academy
☐ Coast Guard O.C.S. (College graduates only)

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City______ State______ Zip____

Phone number__________

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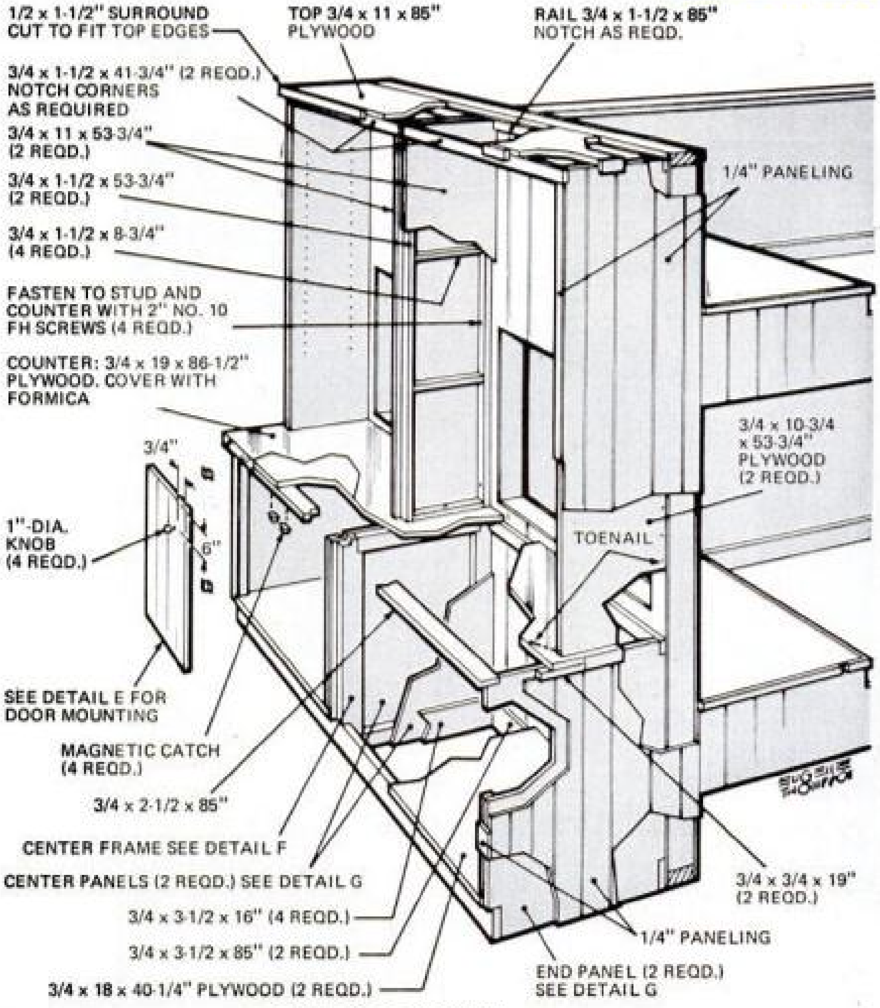
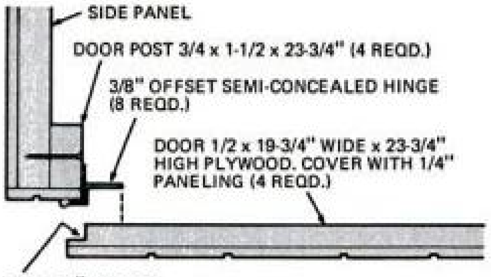
wide masking tape over the design. This tape is transparent enough to permit easy cutting out. Carefully remove tape over all parts to be painted, making certain to burnish all tape edges to eliminate any chance of bleeding paint.

Apply acrylic paints as they come

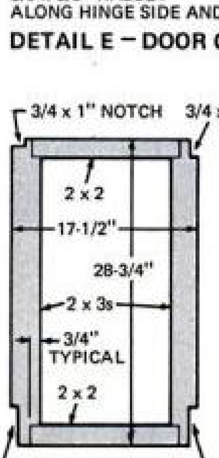
(Please turn to page 172)



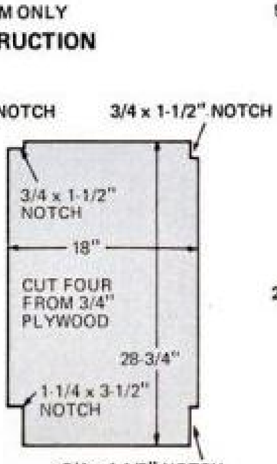
DIVIDER ASSEMBLY



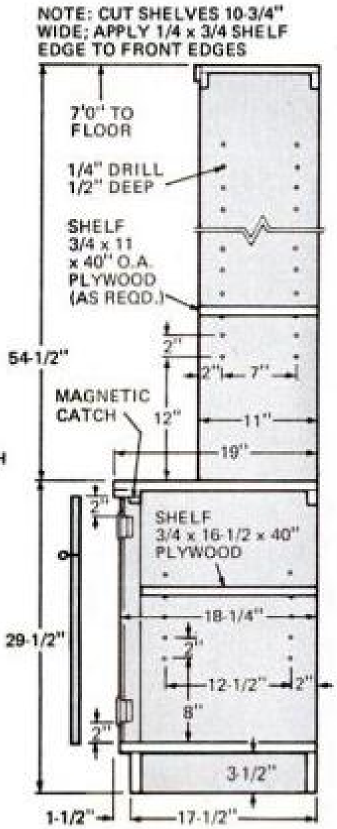
DETAIL E — DOOR CONSTRUCTION



DETAIL F



DETAIL G



SECTION VIEW

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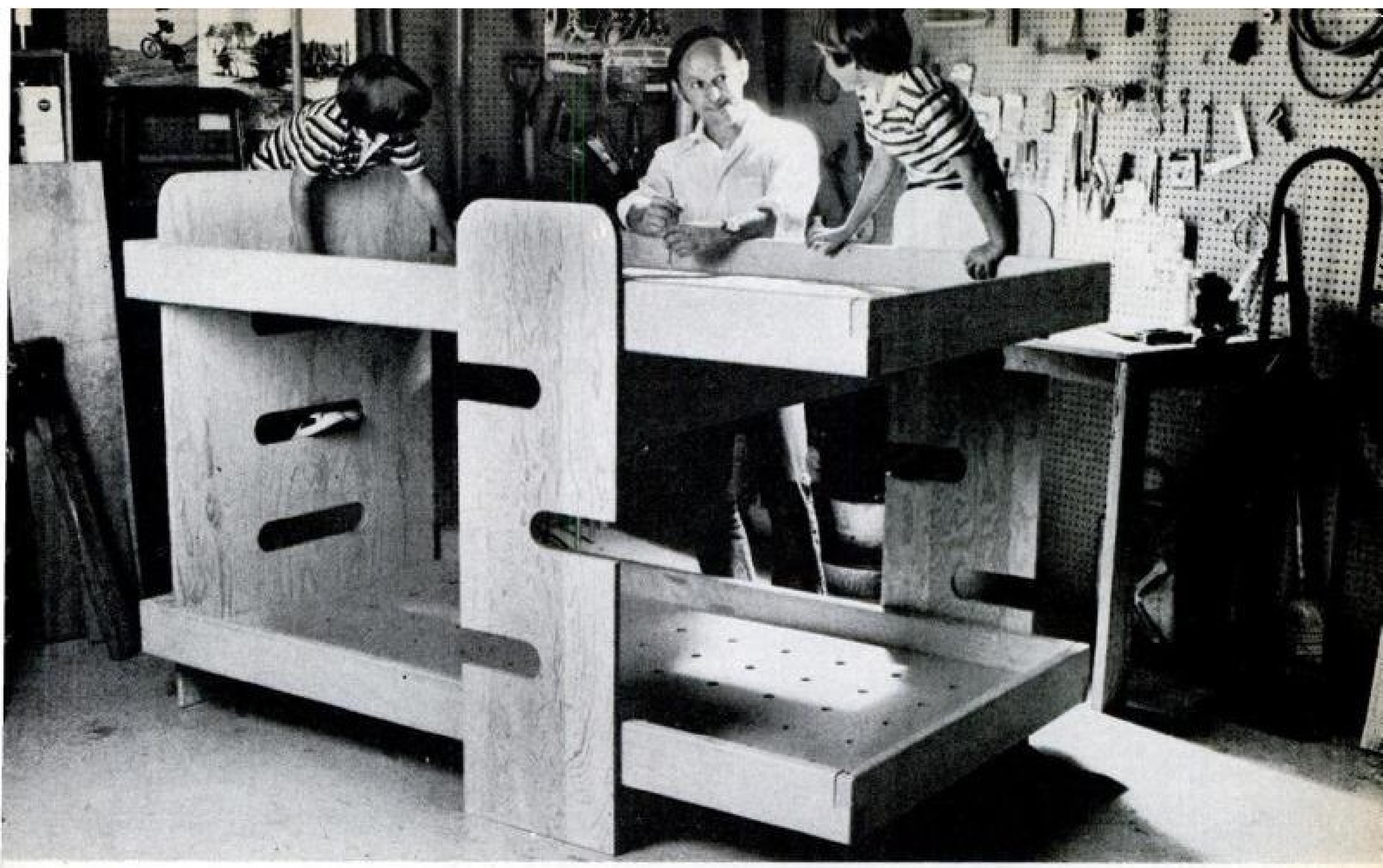

Help your kids make their bed.

Build a bunkbed, a coffee table, a T.V. stand or any of the practical ideas in Georgia-Pacific's new, fall Projects Booklet. It's full of constructive ways to have fun with your family. And it's free, in the Help Center, at your neighborhood Georgia-Pacific Registered Dealer.

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There's a whole section with exciting new ideas on remodeling with wall paneling. And another with helpful free booklets that show you how to choose and use building materials like a pro.

Pick up your free Projects Booklet today. And before you begin any fix-up or remodeling job, stop by the Help Center at your nearby Georgia-Pacific Registered Dealer. It could save you time and money. And that's no bunk.

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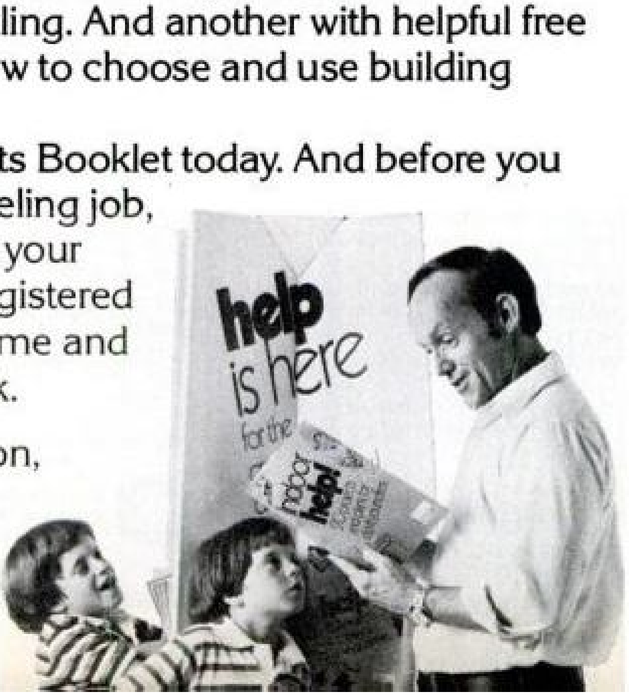
The new Projects Booklet and HELP for do-it-yourselfers are available only at Georgia-Pacific Registered Dealers.



Help is just around the corner.

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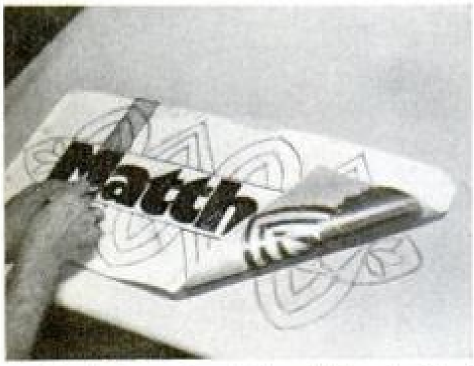
(Continued from page 170)

from the tube. If necessary, use gel medium sparingly to thin. Clean brushes with acetone. ★★★

Tools and materials for decorating shades include (clockwise from top) gel medium, acetone, artist's acrylic brushes, acrylic paints and various drafting supplies—triangle, kneaded eraser, pencil, graphite stick and X-Acto knife with No. 16 blades.

PM photos: Don Mannes



Design is transferred by rubbing back of working drawing with soft pencil, taping it to shade, redrawing with hard pencil.

Wide masking tape is then affixed over design. Since it's transparent, the lines can be seen for easy cutting with knife.

As each section of design is cut out, peel off the waste. Use a knife tip to make certain that all lines are cut cleanly.

(For more photos, turn to page 174)

"Grit-Edge" blades trim tile with style.

Remington "Grit-Edge" rod saw and hacksaw blades make contour cuts in ceramic tile, snag-free cuts in high-pressure hose, cuts at any angle in hardened steel, space-age alloys and plenty of the other "unsawables".

Hundreds of tungsten carbide particles permanently bonded to "Grit-Edge" blades make them a match for materials conventional blades can't tackle.

Economical, durable "Grit-Edge" blades take the tough out of tough jobs.

For more information, see your hardware dealer or write: Abrasive Products, Dept. 785, Remington Arms Company, Inc., Bridgeport, Conn. 06602.

GRIT EDGE When ordinary blades can't cut it. **Remington** DU PONT

"Grit-Edge" is a trademark registered in the U.S. Patent Office.
"Remington" is a trademark of the Remington Arms Company, Inc.

"Grit-Edge" blades can cut it.

Material	Rod Saw	Hack Saw	Saber Saw	Circ. Saw	Band Saw
Asbestos-Cement	X	X	X	X	X
Beryllium	X	X			X
Carbon	X	X		X	X
Cast Iron	X	X			X
Composites	X	X	X		X
Composition Board			X	X	X
Fiberglass	X	X	X	X	X
Foamed Glass	X	X			X
Friction Materials	X	X	X	X	X
Glass	X	X			X
Hardened Steel	X	X			X
Honeycomb Materials					X
Marble, Natural	X	X	X		X
Marble, Synthetic	X	X	X	X	X
Plaster			X	X	
Plastic Laminates	X	X	X	X	X
Plywood			X	X	X
Stainless Steel	X	X	X*		X
Stranded Cable	X	X			X
Superalloys, Iron-base	X	X			X
Superalloys, Nickel-base	X	X			X
Tempered Hardboard			X	X	X
Tires, Steel-reinforced					X
Titanium	X	X			X
Tile, Ceramic	X	X	X		X

*Requires coolant and variable – speed machine

GRIT EDGE When ordinary blades can't cut it. **Remington** DU PONT

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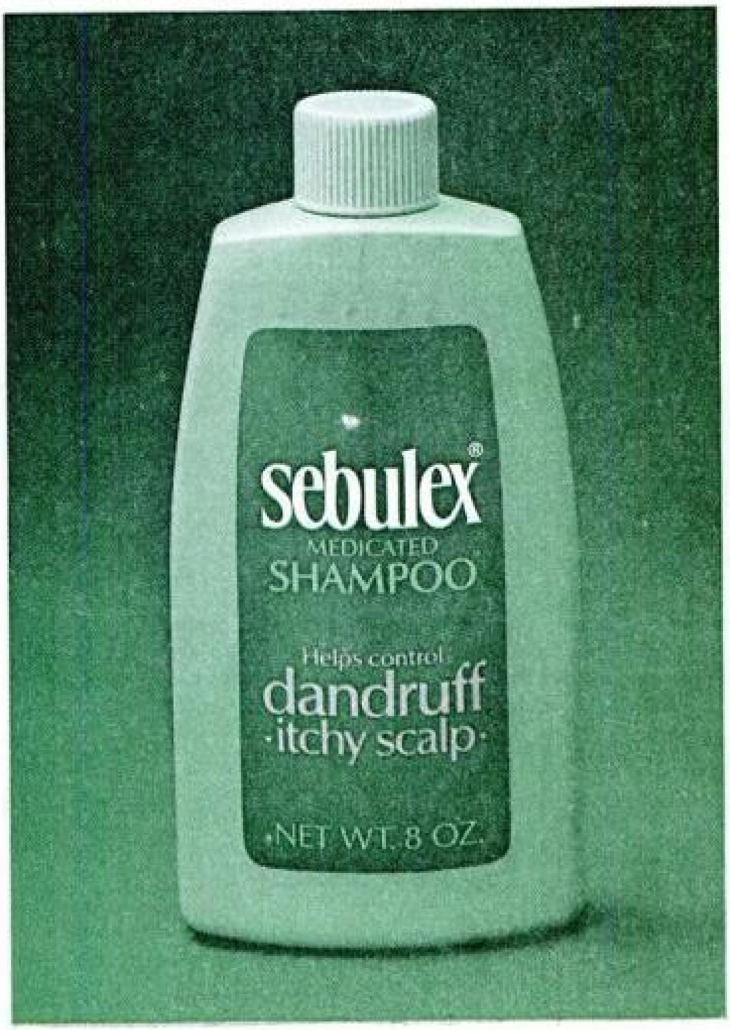
You've never tried Sebulex.® You still see dandruff. There could be a connection.



There's only one way to judge how effective a dandruff shampoo can be for you.

Try it.

You've probably tried the leading brands. But, if you haven't used Sebulex,® you may have overlooked the one shampoo that works best on your hair and scalp.

Doctors recommend Sebulex for dandruff

When we asked over two hundred skin specialists what product they usually recommend for patients with dandruff or scaling of the scalp, the word came back—Sebulex.

Four times more than the leading dandruff shampoo.

Seven times more than the next largest selling dandruff brand.

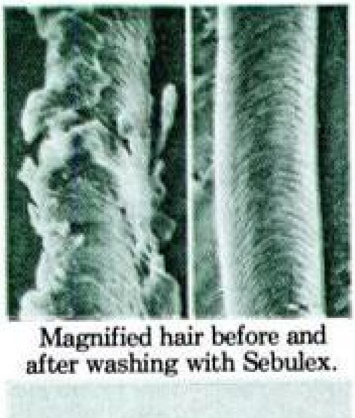
If you're out to control your dandruff, to help stop the oiliness and itching, use what more doctors recommend—Sebulex.

Sebulex cleans away everything in sight

Extra strength cleaning agents in Sebulex penetrate, peel and float away dandruff. They carry medication down to the scalp and follicles of the hair to quickly relieve flaking and itching.

You come away from a Sebulex shampoo with hair that's fresh and really clean, right down to the roots.

And with regular shampooing, it will stay that way.



Magnified hair before and after washing with Sebulex.

A low pH factor

Sebulex has the lowest pH of the leading non-prescription dandruff shampoos.

That's because it contains a special combination of medicated ingredients. They could be the key to the dandruff control you're looking for. Try the medicated action of low pH Sebulex.

All you have to lose is your dandruff.

Effective dandruff control, pleasant to use

The first thing you'll notice is the thick, rich consistency of Sebulex right out of the bottle.

Sebulex builds to a concentrated, creamy lather that really gets dandruff off your back.

Clean, fresh scent

Some people think that a hard working medication can't smell good. Well, Sebulex has a clean, fresh scent that won't advertise that you're using a medicated shampoo. Even when you're up close.

The real proof

This Sebulex story is only proof for the inside of your head.

We'd like to prove it to you on the outside.

Buy Sebulex. Shampoo-in the Sebulex medicated lather and look at your hair when it's dry.

That's where we shine.

Clean, green

sebulex®

recommended by specialists

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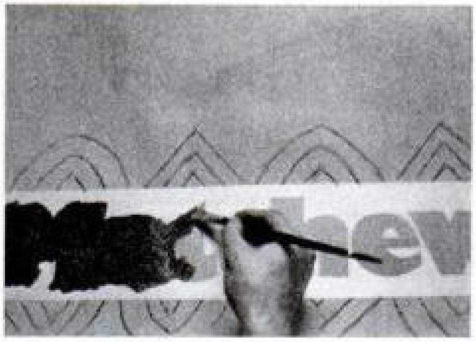
TWO ROOMS FROM ONE

(Continued from page 172)

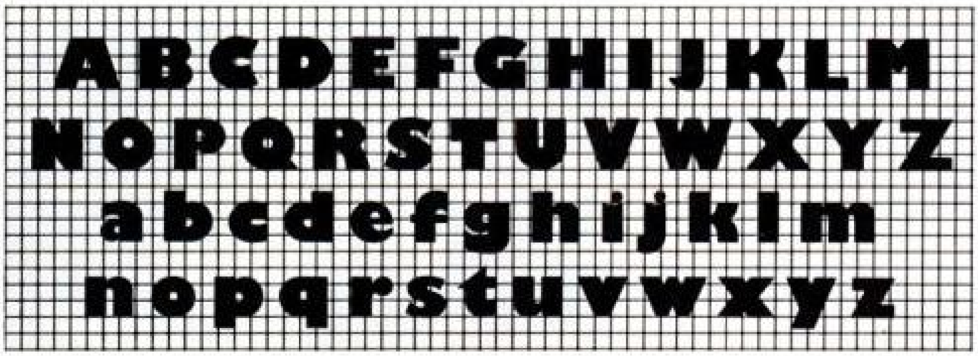
Burnishing of cut tape edges is very important. If poorly done, paint will bleed. Use other end of X-Acto knife to do this.



Use paint as it comes from the tube; if it must be thinned, do so with gel medium. Clean all encrusted brushes with acetone.

After paint dries, peel off masking tape frisket. Carefully check all edges and touch up as necessary with artist's brush.

Repeat entire frisket-and-paint operation to create designs around letters. Notice that tape covers portion of lettering.



Size squares for lettering to suit area to be painted. On shades shown, each square equals 1 in. Type face is Gill Kayl.

SIZE SQUARES TO SUIT

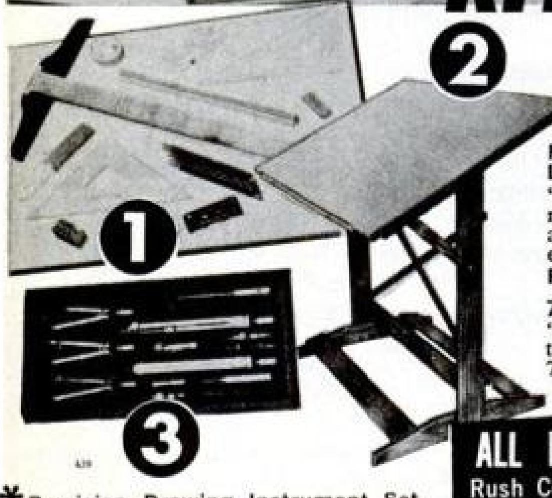
Plenty of Jobs, Good Money in Drafting—*according to U.S. Government Forecasts and Surveys of Private Industry*

U.S. Dept. of Labor reports future for draftsmen *"favorable"* . . . predicts rise in demand for qualified draftsmen. The Grantindustrial Company (Bruning Co.) reveals 94% of firms recently surveyed anticipate current demand for entry-level technicians will continue at least 5 more years.

Salaries for draftsmen climbed 25% during last 3 years, according to 1974 survey of 6,000 draftsmen, by American Institute for Design & Drafting. Same survey reveals 78% believe there is *shortage* of good draftsmen.

YOU NEED NO DRAWING SKILL . . . NO TECHNICAL ABILITY

We supply necessary equipment plus easy-to-master, step-by-step instructions. Our staff of professional draftsmen guides you all the way. Even students not eligible to train elsewhere, because they lack high school diploma, have completed our course successfully.



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72% SALARY INCREASE!

"The Course helped in my promotion to senior estimator, with a 72% salary increase!"
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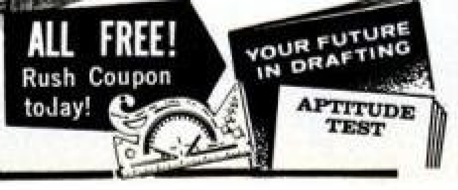

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CREATIVE THINKERS! CREATIVE THINKERS!

YOU KNOW YOUR I.Q. LET'S TEST YOUR C.Q.

(creativity quotient)

This is a test developed by Dr. H. S. Schultz and Mr. Earl Nightengale:

	YES	NO
1. Do you jot down new ideas?	☐	☐
2. Do you take prompt and positive action on your better ideas?	☐	☐
3. Do you make it a daily habit to really use your eyes?	☐	☐
4. Do you look at things carefully?	☐	☐
5. Do you absorb while you observe?	☐	☐
6. Do you ever ask yourself questions like these:	☐	☐
a. How can I improve myself?		
b. How can I be more effective in my work?		
c. How can I help make my community nicer?		
7. Have you ever written down your specific personal and business goals?	☐	☐
8. Do you spend some time each day purposefully reading or listening to others?	☐	☐
9. Do you make a steady effort to widen your interests and friendships?	☐	☐
10. Do you welcome ideas from everywhere?	☐	☐
11. Do you always try to fully understand something before you pass judgment?	☐	☐
12. Do you often say: "There must be a better way."	☐	☐
13. Do you have a positive mental attitude?	☐	☐
14. Do you have record-keeping habits?	☐	☐
15. Would you be willing to expand your creative thinking?	☐	☐
16. Do you acknowledge the existence of Infinite Intelligence?	☐	☐

You should have about twelve "yes" answers on your C.Q. test to effectively use this tape offer.

THE A.B.C.'S OF TURNING DREAMS TO DOLLARS
HOW MANY TIMES HAVE YOU SAID . . .

"I THOUGHT OF THAT TEN YEARS AGO," OR "WHY DIDN'T I THINK OF THAT?"

While ideas *are* free, their worth grows directly in proportion to the *effort* applied.

Perhaps your ideas have never borne fruit because: 1. the patent attorney wanted $1,000; 2. the idea developers wanted $1,500. Need I go on??

I KNOW, I'VE BEEN THERE!

I have spent the last ten years taking my ideas from embryo to product, through all developmental phases and placing them in the hands of the consumer.

"PRACTICE MAKES PERFECT." With my first invention I spent eighteen months, plus $400,000 in the development of a legal wireless microphone. Today I could do the same project in 60 days at a cost of $50,000!!

I DON'T WANT your idea, or to be your marketing department, or your legal counsel, or your financier, or *any* piece of your action.

I DO WANT YOU TO ORDER THIS CASSETTE.
I DO WANT YOU TO BE SUCCESSFUL.

I know I can help you — my staff and I are willing to assist you in any way we can.

FOR THE FIRST TIME — **A SIMPLE APPROACH** for getting done what you always knew you could do!

For a token fee of **$10.00** I will share with you the expertise gained from "learning it the hard way."

Here is what you will receive:
- a 60-minute cassette tape "DREAMS TO DOLLARS"
- a disclosure agreement (to protect your ideas)
- a catalog of other services available
- an application to join **THE INVENTING ARTS ACADEMY**

Yes! The materials I will send you will enable you to protect *your idea* — get *your idea* evaluated — determine if *your idea* is marketable — and assist you in properly pricing *your idea*.

Not only will you learn how to do it, you will learn how to do it for less than $100!!!

Some of the subjects covered are:
- motivational encouragement
- what is the first thing you do?
- what is mother love?
- can someone steal your idea?
- when to find a patent attorney.
- do you really have an invention?
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CREATIVE THINKERS! CREATIVE THINKERS! CREATIVE THINKERS! CREATIVE THINKERS!

PM'S PAINT-JOB WINNERS

(Continued from page 100)

painting that they take on side-line assignments and use their rigs to promote their work.

Among those not shown are two excellent vans from Milwaukee which displayed the delights of beer: One resembled a six-pack with the roof painted to show the flip-top cans. Another opened a bottle just behind the driver's seat, and from it heady foam flooded back in attractive bubbles over the rest of the rig.

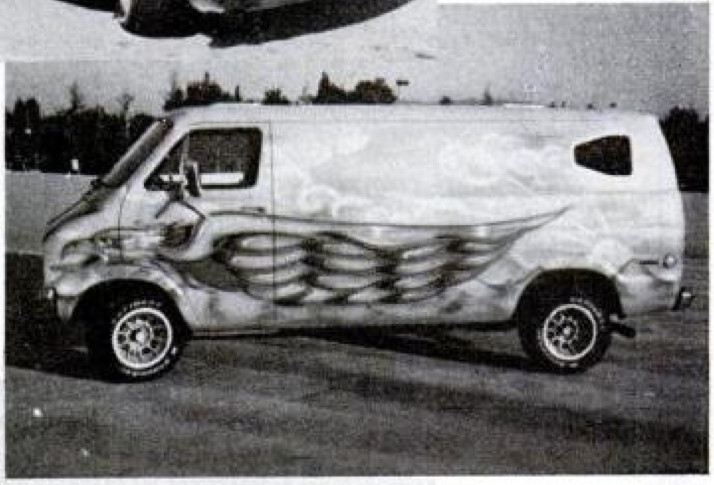
Outdoor activities and scenes were popular topics, with hunting, fishing, animals, seascapes and mountain vistas ranking high. Many entrants used air brushes to add modeling to flames, females, metal-flake design elements, and streaks to simulate speed even while the vehicle is parked.

Vehicle artistry is not limited to panel vans. Pickup trucks and camp-

(Please turn to page 178)

RUNNERS-UP

California, creative spawning ground of custom cars, is home of this action van. Owners Craig Campbell and Frank Bartels show activities and accessories outside.



In full flight, an impressive eagle streaks across Don Britlin's van in San Jose, Calif. Bird swoops low to fly below additional windows in doors on the right side of vehicle.

Deer, bighorn sheep, grizzlies, fox, trout, woodchucks, elk, beaver and chipmunk are all shown on ¾-ton 4WD Lancaster, Pa., pickup Marlin Harnish uses for farming, camping.

Lake scenery and design are combined in full-color metal-flake paint with different patterns on sides of Danny Olsen's van from South Lake Tahoe, Calif.

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Cliff Hicks,
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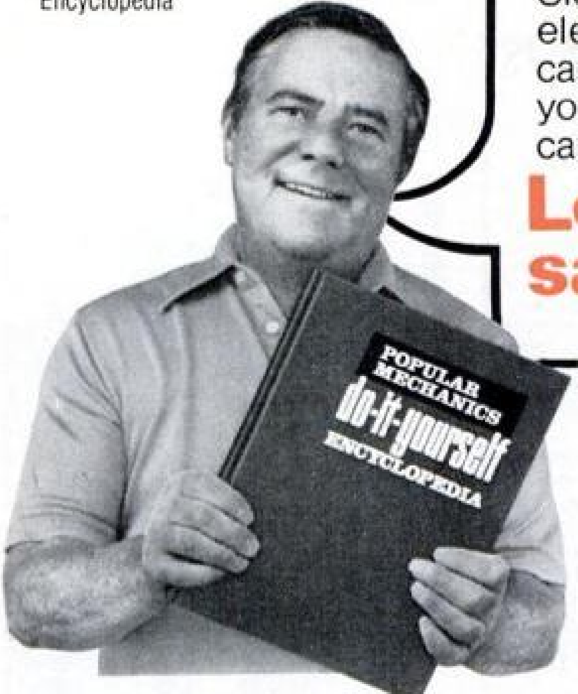

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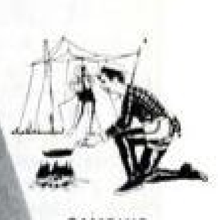
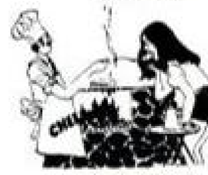


CAMPING

MASONRY



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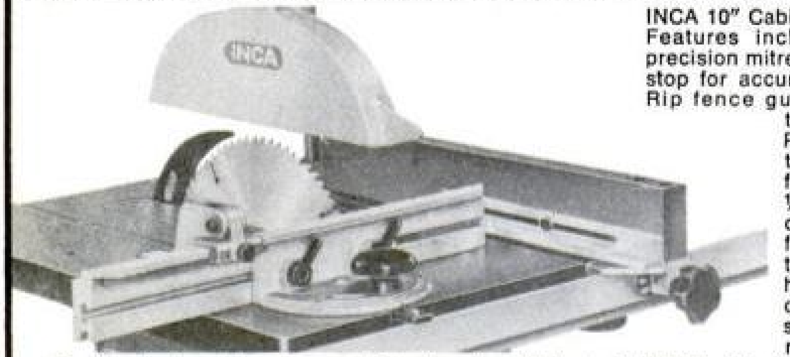

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PM'S PAINT-JOB WINNERS

(Continued from page 176)

ers, station wagons, motor homes, campmobiles, VW bus and school bus conversions, delivery trucks and even tractor trailer cabs were among the entries PM received! ★★★

RUNNERS-UP

Bicentennial motif is emblazoned across GMC wagon of Paul Duckett, Springfield, Ohio. Stars and stripes decorate sides and seal of Ohio is on spare tire cover.

The scenic attractions of West Virginia—waterfalls, Monongahela River and horse farms—all are displayed on Junior Rakosi's Winnebago from Pursglove, W. Va.

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OUTBOARD TOO HOT TO NAME

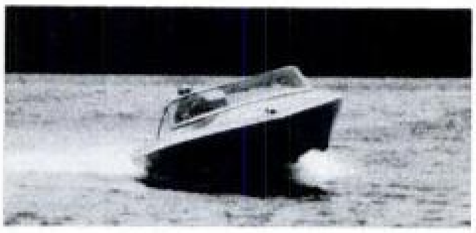
(Continued from page 87)

25-inch-long lower unit stuck the prop down where it didn't try to break loose and cavitate on even very sharp turns. Speed with the CheckMate measured about 60 mph without full break-in of the engine, experimenting with motor height and trials using various prop selections. Recommended rpm will be 5250 and SST stainless Teflon props will be available.

Running back from the test course, I switched to the Molinari to watch how the runabout with its cleaver-propped rooster tail looked trimmed out—a good idea for both power and sail analysis. It was a slick sight. The Molinari had the famous tunnel turning control, but was clumsy getting on plane and may need further development.

Back at the test lab we pulled the cowling to look at the new bulges which allow full exhaust megaphone pulse tuning for each cylinder and provide the major boost in horsepower for this 90° V6-cylinder, 3.5-inch bore and 2.588-stroke muscle-mill. Interesting details, but the payoff is in impressive performance.

And that one last figure? Within weeks the word is finally out. Next year will see an Evinrude with 235 painted on the side—the biggest production outboard ever built. ★ ★ ★



Famous Molinari tunnel has been adapted to a 21-foot open hull with twin 140s.

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Alfred Burk, Missouri

4 FURNITURE STORES AND 10 OTHER PLACES

"I've been in this business only 3 weeks, but I'm doing work for 4 furniture stores, and 10 other places, bowling alleys, schools, etc. The 'going into business' helps sure help me, with no experience running a business." **V. Voris, Ind.**

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"9 Holiday Inns have us on a monthly allotment and we are busy every day. We are putting on 1 repairman for our other business. Wonderful to be one's own boss. With our setup, we have weekly checks just from the Inns."
Mr. & Mrs. Bechtel, Ohio

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Mrs. M. Herren, Utah

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'HOW DID IT HAPPEN?'

(Continued from page 82)

The car continues spinning counterclockwise across the road, dragging the woman along. The spinning vehicle sweeps past a power pole, trapping the woman's leg between the car and pole. The leg is sheared off.

The front of the car spins into the pole and comes to rest.

Could it have been prevented?

In the thousands of accident reports sent to Washington since the team investigation program began about 15 years ago is a section called "Casual Factors, Recommendations, Conclusions." This section is the heart of every report.

NHTSA Personnel sift reports to see if a single cause predominates. If it does, the recommendations assume greater importance.

For instance, in the report concerning this accident the University of Miami team's recommendations included the following:

- That legislation be passed requiring all occupants of motor vehicles to wear restraint systems and that insurance at a reduced rate be offered to those wearing belts.

"V2/1 would almost certainly have survived . . . had she worn the available four-point restraint system," the investigating team concluded. "V2/1" refers to the driver of vehicle 2 involved in the accident—that is, the dead woman.

- That federal standards be established prohibiting trees and poles within a safe, specified distance of intersecting crossings so adequate line-of-sight distances can be maintained.
- That stricter licensing laws be enacted that would require re-examination of drivers involved in fatal or serious accidents and greater stress on defensive driving tactics.

"As is frequently the case in accidents, no one party or cause was to blame for this one," Morrow points out. "It was a series of events that led to the woman's death—blocked vision, attempting to negotiate an unsafe intersection, speed, not wearing restraints."

Working to save lives

Recently, NHTSA accident investigation teams shifted gears. After years of gathering on-site data about the causes and effects of multivehicle crashes, teams are being engaged in specialized studies.

For example, programs now underway include an air-bag feasibility study; causes and effects of fatal truck, school bus and motorcycle accidents; a study concerned with rear end collisions; and pedestrian accidents.

The team at the University of Miami recently completed a study dealing with single-vehicle accidents in which 620 one-car accidents were investigated over a two-year period. One fact that stands out is the same old story:

"Death and injury in single-vehicle crashes can be substantially reduced if parties wear restraints."

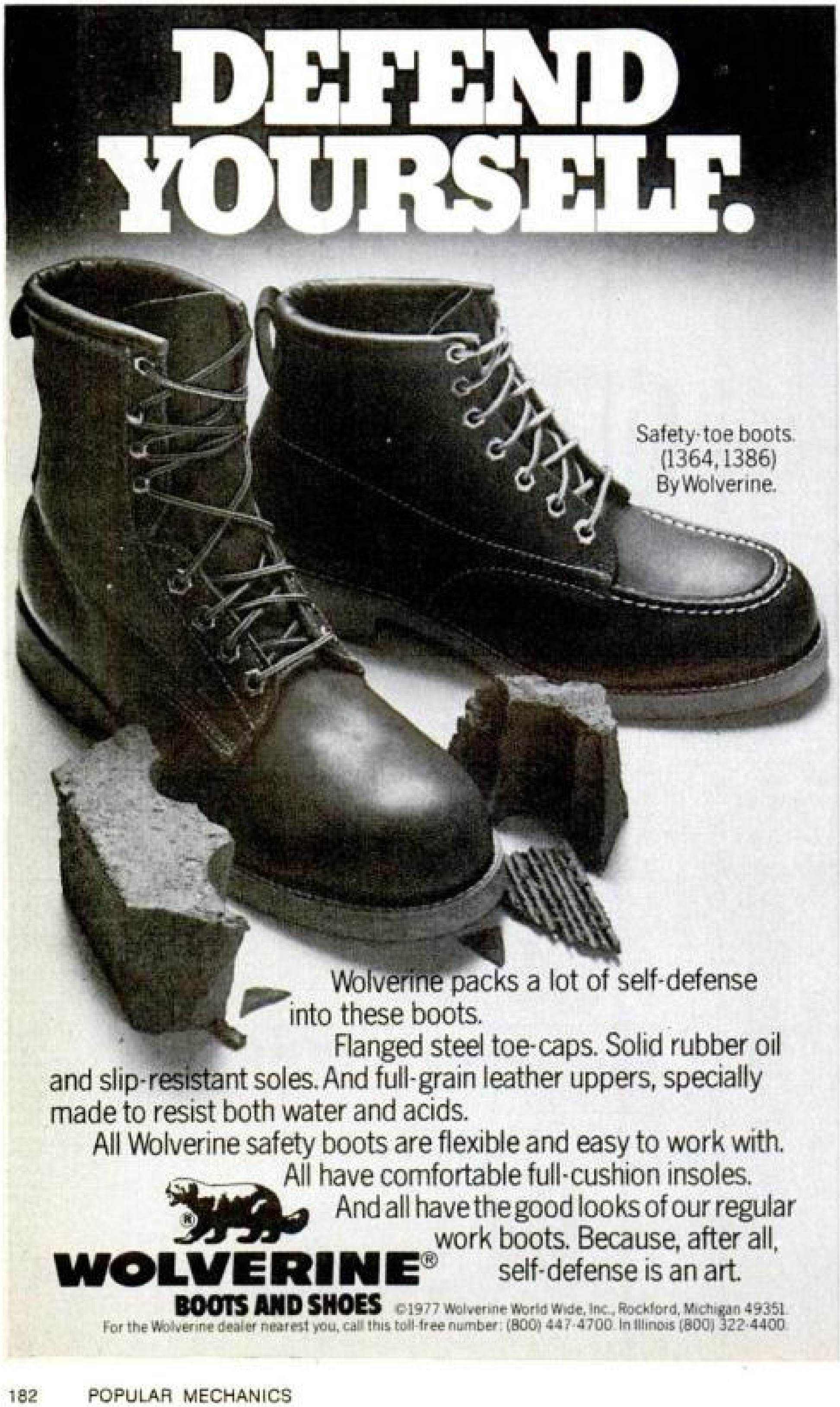
A case used to substantiate this conclusion involved a young woman bent on committing suicide. She aimed her 1973 Triumph at 50 mph straight at a tree.

When police arrived, they found her sitting complacently and uninjured in her wrecked car. She was wearing the restraint system. Why?

"I couldn't stand the sound of the buzzer," she explained, referring to the noisemaker in her car that couldn't be silenced without buckling the belt.

Other facts established by the single-vehicle accident study, which was funded by NHTSA at $215,000, are the following:

(Please turn to page 186)



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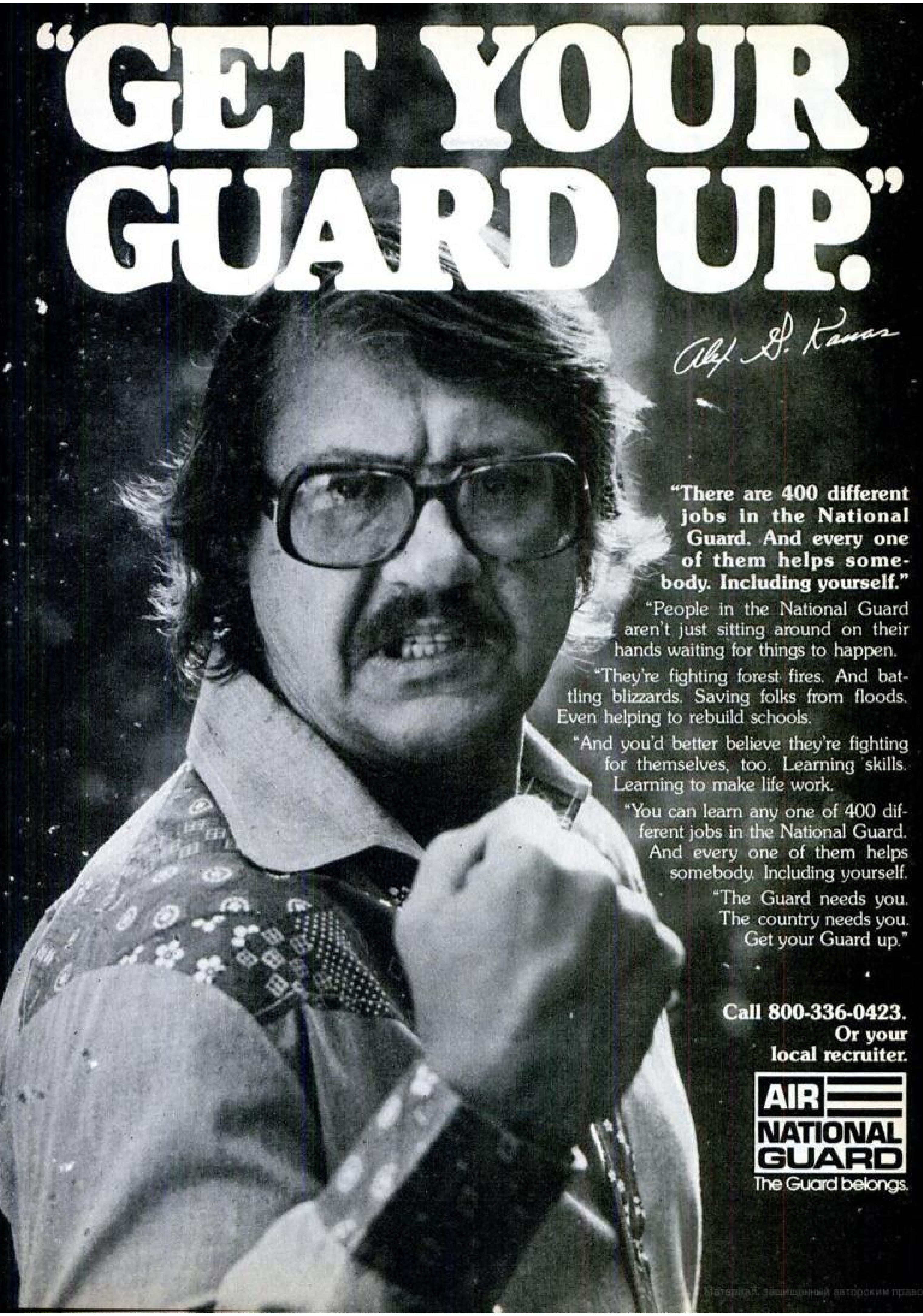
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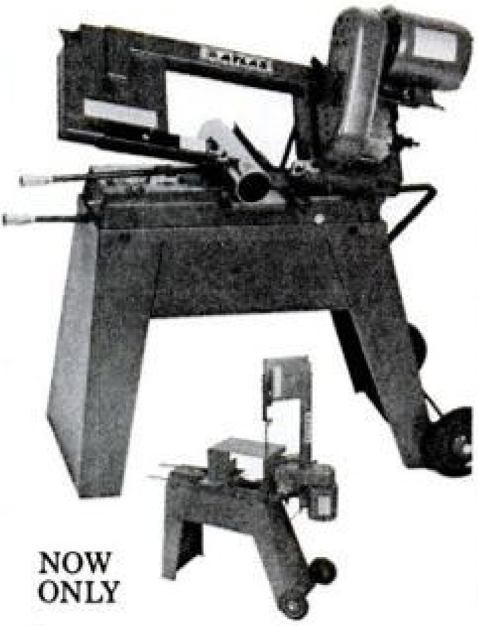

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'HOW DID IT HAPPEN?'

(Continued from page 182)

■ Surprisingly, twice as many deaths occur in one-car accidents as in multivehicle crashes. The reason is the sudden and severe deceleration that occurs. When a car hits a tree at 50 mph, for example, the body decelerates from 50 to zero in a fraction of a second. It's like falling to the pavement from the top of a six-story building.

In a two-car crash, deceleration isn't as severe. The "give" of metal meeting metal reduces the effect.

■ The greatest number of single-vehicle accidents involves a car hitting a fixed object. However, over 30 percent of cars involved in single-vehicle accidents roll over. And approximately 70 percent of these are small, foreign cars. Conclusion: Small, foreign cars have a greater tendency to roll over than larger domestic vehicles.

■ The greatest threat to occupants during a roll-over are ejection and being crushed if the roof collapses. Flat roofs are more susceptible to cave-in than round roofs. Conclusion: The trend toward flat roofs in new car design will contribute to an increase in roll-over injuries.

■ The greatest single reason for one-car accidents is inattentiveness, which includes fatigue and excessive alcohol intake. This accounts for better than 75 percent of all single-vehicle crashes.

Second on the list is highway design and environment which lead to confusion and misjudgment by drivers. This accounts for more than 20 percent of all single-vehicle accidents. Other reasons are illness, suicide and vehicle mechanical failure.

■ Gasoline conservation notwithstanding—the heavier the vehicle, the less chance there is of death and serious injury.

In months to come, new federal standards pertaining to vehicles which will increase your chance of surviving a one-car accident may evolve because of this study. Who knows? Vehicles may have to be recalled by manufacturers to strengthen flat roofs that crush easily in roll-overs.

In addition to the team at the University of Miami, other teams are at the University of Kentucky in Lexington, Indiana University in Bloomington, Southwest Research Institute in San Antonio, Tex., Highway Safety Research Institute in Ann Arbor, Mich., Calspan Corp. in Buffalo, N.Y., and Ultrasystems, Inc., in Los Angeles, Calif., and McLean, Va. ★★★

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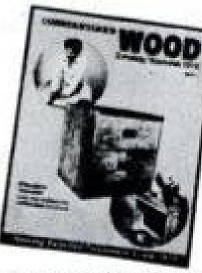

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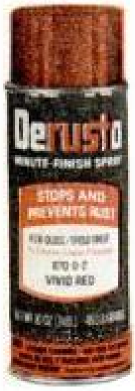

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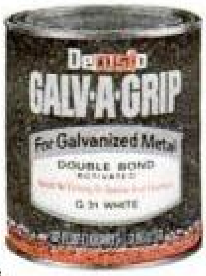

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HAVE MORE CB FUN WITH THESE ADD-ONS (Continued from page 78)

mitters. Without a direct connection to your radio, the meter will tell you if the transmitter is putting out radio-frequency (RF) energy. If you always operate your field-strength meter and radio the same distance apart, you'll be able to tell if power output from your radio drops off one day.

SWR bridges let you know just how efficiently your antenna system is working and how well it is matched to your transmitter.

Modulation monitors display your voice as kicks of a meter needle. You can tell if your audio is getting into the modulation circuitry of your CB rig.

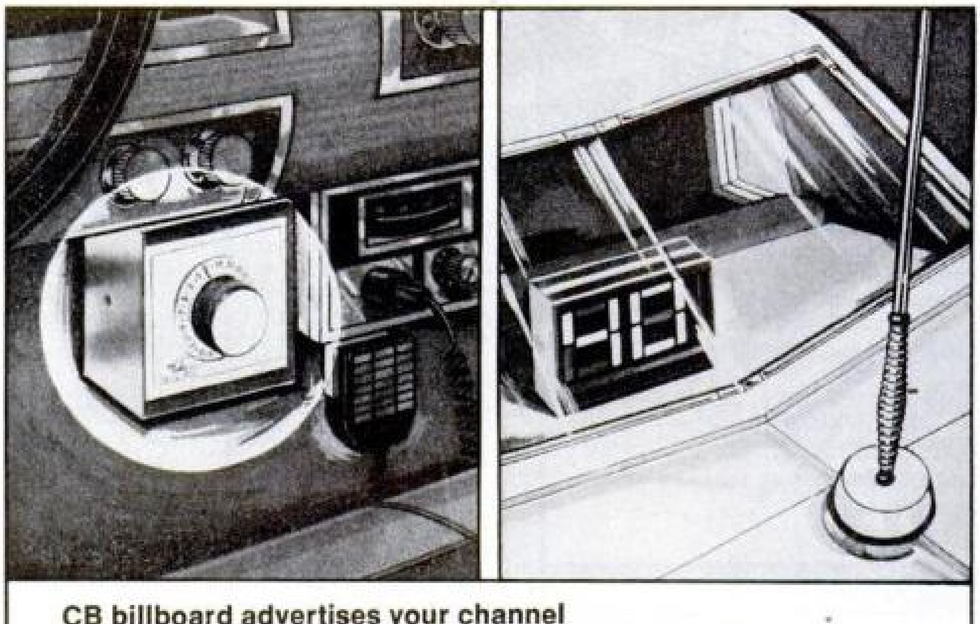
Power meters, which have to be closely calibrated to give true readings, tell you exactly how many watts of power your transmitter is de-

CB sleeper

Now your partner can sleep while you listen. Wispee, a lightweight $15 miniature external speaker, plugs into your radio, lets you listen in private at home or in car. From Prime, 8605 Quivira Rd., Lenexa, Kans. 66215.

8-track CB

Listen to CB in simulated stereo with Sound Around ($10) from GC Electronics, 400 South Wyman, Rockford, Ill. 61101. Plug it into external speaker jack on your radio, slip cartridge into your home or car 8-track player.



CB billboard advertises your channel

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livering to the antenna at one time.

Frequency counters, exciting to watch and useful for determining the exact spot where you are transmitting, display your kilohertz in light-emitting diodes (LEDs).

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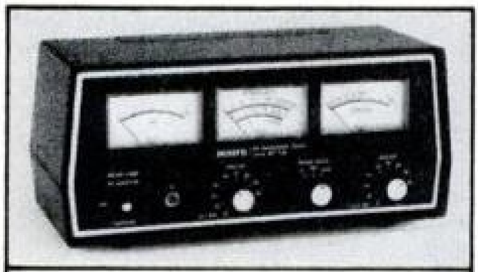

Transceiver tester

Monitor power output, modulation level, and antenna SWR at once with MT-703 ($69) from Robyn International, Box 478, Rockford, Mich. 49341.

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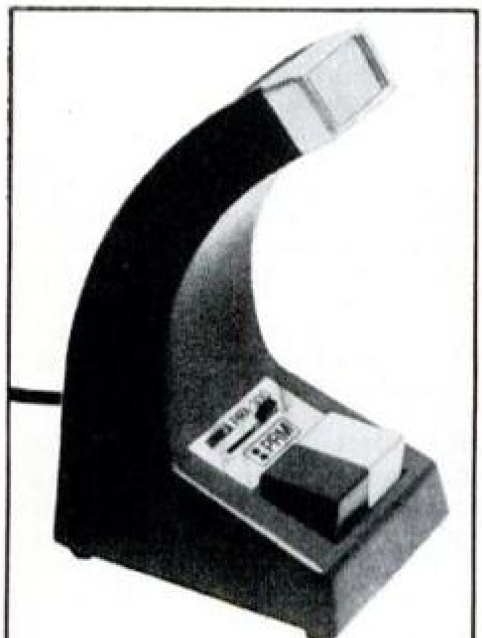

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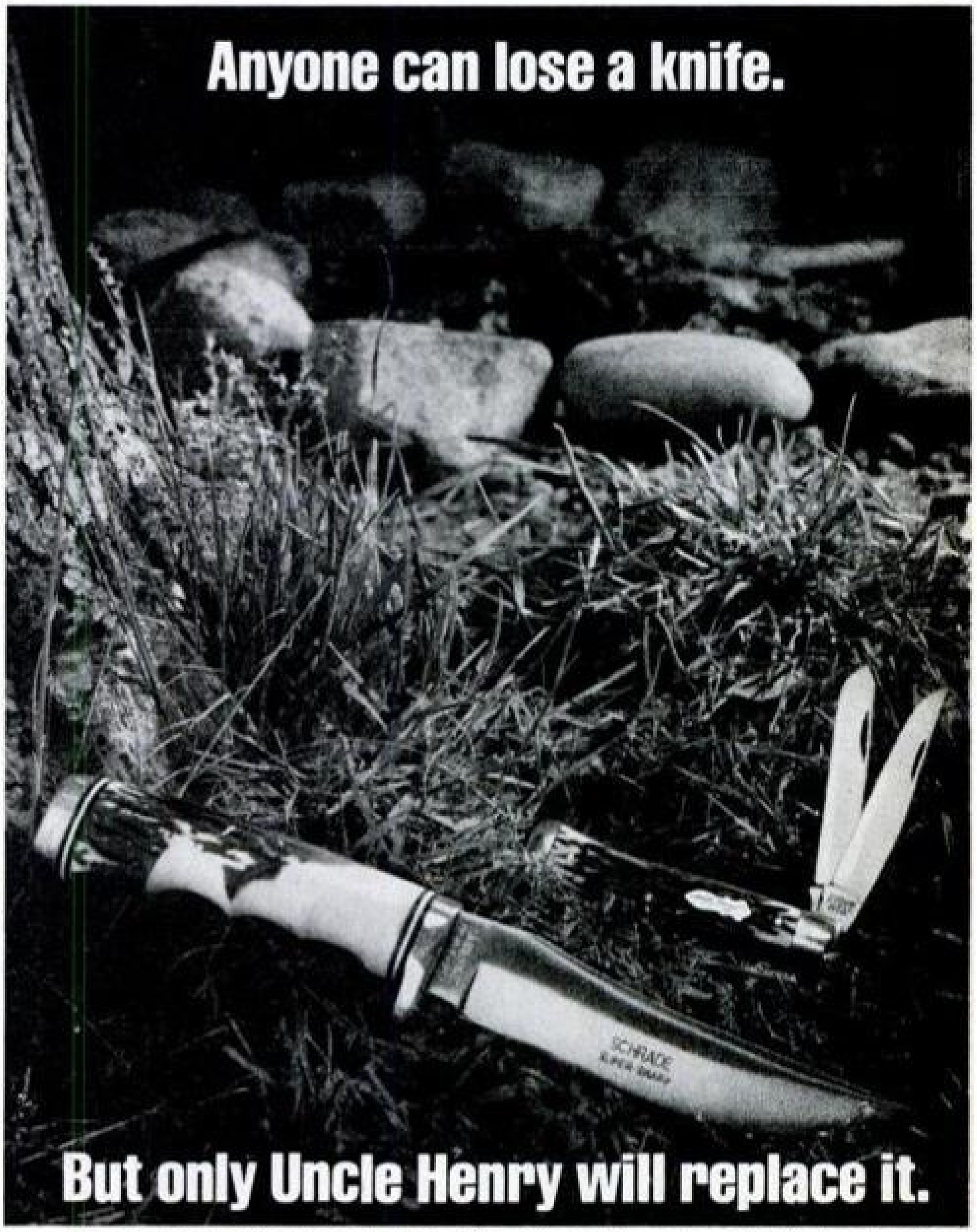

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CORVETTE OWNERS REPORT

(Continued from page 75)

Though scattered among the other cars owned were a few imports, such as VWs and Hondas, Corvette owners tended to be a buy-American crowd. For them it was the only choice because they wanted a sports car but did not, they firmly stated, want to buy a foreign car.

Those who had owned Corvettes before found it easy to tell us why they'd bought a '77 model. "Once you have had one it gets in your blood," said a Michigan purchasing agent. He was obviously an addict: His 1977 car was his 18th Corvette. "I have been driving them since 1969," said a self-employed Indianian, "and every time I drive the car it's still like the first time. It's like having a new toy each and every time you drive it."

A young New York couple had two other Corvettes before buying their 1977 car. Wrote the wife, a secretary, "My husband sells Datsuns, Fiats and other imported cars. We could buy any one of these at cost. The more I think about it, the only explanation I have for constantly buying Corvettes is that we are both car crazy. We both wanted a Vette since we were very young, and I guess we just haven't gotten them out of our systems yet. Even with all the disadvantages of owning a Vette, there just isn't any other car like it."

Newcomers to the Corvette ranks varied somewhat in their reasons for picking this car. "I guess all you can say about a Vette is 'fantastic'," glowed an 18-year-old Arkansan. "The fact that the car is a Corvette and that I own it makes me proud to drive it down the street," said an Illinois man. "I love it when people stare at my car." And an Iowa mechanic stated, "The car is a legend in its own time, and no other American-made car can compare with its styling and handling ability. And it still gets the pretty girls."

"Always wanted one"

These were variations of views on the reasons for buying a Corvette. They were echoes of the main theme, which was sounded again and again by owners of 1977 cars. That theme was: "I always wanted one." It was stated over and over again in exactly those words in dozens of responses. "Always wanted one." Some mentioned having craved a Corvette since they were 10 or 12 years old; only 10 years later were they able to scratch that early itch. And because the Corvette hasn't changed much in appearance, a car much like the one of their dreams was still available when they came into the market.

Dave McLellan referred to this in his SAE paper on the Corvette customer. "If the demand for the Corvette begins in the teen years and is not satisfied for 10 years," he wrote, "this may argue for a very long product life cycle. This is consistent with the actual life cycle of the Corvette. A long product life cycle has not hurt demand."

Our survey results correlated well with those published by McLellan in the more specific reasons for buying a Corvette. Far and away the strongest reason, was styling, mentioned in 55.8 percent of the replies. These folks love the Corvette's dashing looks and its individuality: "A Corvette is as unique as Cinderella's glass slipper," said a poetic Alabama electrician.

A good value

Rated next as a reason for buying, by 25 percent of the owners, was resale value. This too was in line with Chevrolet's own research, which showed that Corvette buyers were much more sensitive to the resale value than to the price. "It is an investment I can enjoy while I own it," explained a Michigan project administrator. Said a 29-year-old Texan, "It is the only new auto that I know of costing $10,000 that will not depreciate excessively over a one-year period. Where else can I buy a $10,000 car, drive it for a year, and sell it for what I paid for it?"

Performance figured much lower as a reason for buying in our survey than it did in the Chevrolet data, which referred to 1975 models. Buyers were becoming aware that the Corvette is no longer the open-road stormer it once was. "Bring back the big-block engines!" was a cry we heard several times. "We did like the performance of our '72 and '73," said a California GM car assembler, "but the new ones are just like dogs—no power, no four-speed, no nothing in California." Some California buyers had gone to Nevada to order Corvettes with the transmissions and engines they wanted.

Is it comfortable?

Considering the Corvette's obvious limitations, it was felt to be comfortable by most of its owners. "I find the seats comfortable while driving any distance," reported a Michigan stenographer, "and everything seems to be within reach." A California chiropractor had a differing opinion on the seats: "The seats are terrible. They need to be a redesigned by a chiropractor so they will be comfortable." One feature, missing from the '77 model, was requested with con-

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sistency: some form of angle adjustment for the seat back. Owners felt it should be a standard feature in a sports car of this price. Nevertheless, 70 percent of the Corvette owners rated their cars as very good or excellent in comfort. Only 1.4 percent considered it poor in that respect.

When asked what things they disliked about their cars, the responders put paint and finish at the top of the list in 31.6 percent of their replies. They referred to bubbles, blisters and chips in the paint, and used highly uncomplimentary language. "The paint job on a Corvette has to be the worst in the world," said a Virginia attorney. "The car appears to have been thrown together without any regard for quality." Complained a Michigan radio personality: "For the price I think the consumer deserves much more quality, especially exterior paint. The hood looks like wind on a lake. My Corvette is going to have to be reblocked and painted at my expense, and that's a drag."

One in five owners complained about the quality of workmanship in the '77 Corvette. When asked their view of the workmanship, only 12.1 percent rated it excellent and 22.9 percent considered it poor. Those with the latter opinion were bitter. "A Corvette is a car that is pushed through an assembly line as quick as it can go," grumbled an Indiana shipping clerk, "just thrown together so it will look like a car when finished."

Fiberglass vs. steel

A few owners, happy with the quality of their '77s, felt they showed better workmanship than the 1974 and 1975 models. But others showed poor body fits, misaligned interior carpeting and panels, and a tendency for the door cranks to fall off cars with manual window regulators.

The fiberglass body came in for its share of criticism from the standpoint of quality. Eight percent of the owners said the paint tended to crack, and 8.8 percent said they could see the seams in the body through the paint. The resistance to rust was the body's big plus, mentioned by 25.5 percent. It was especially important to those in northerly climes. "I like the corrosion resistance," said a Virginia accountant, "but a few of the seams in the door jambs have cracked."

Polled on the number of mechanical problems they experienced, 61.6 percent of the owners said they had had some in their early experience with '77 models. Of those reporting troubles, the lead, at 19.2 percent, was held by difficulty with the air-

(Please turn to page 192)

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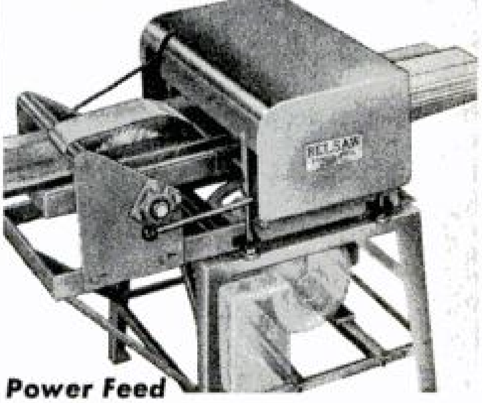

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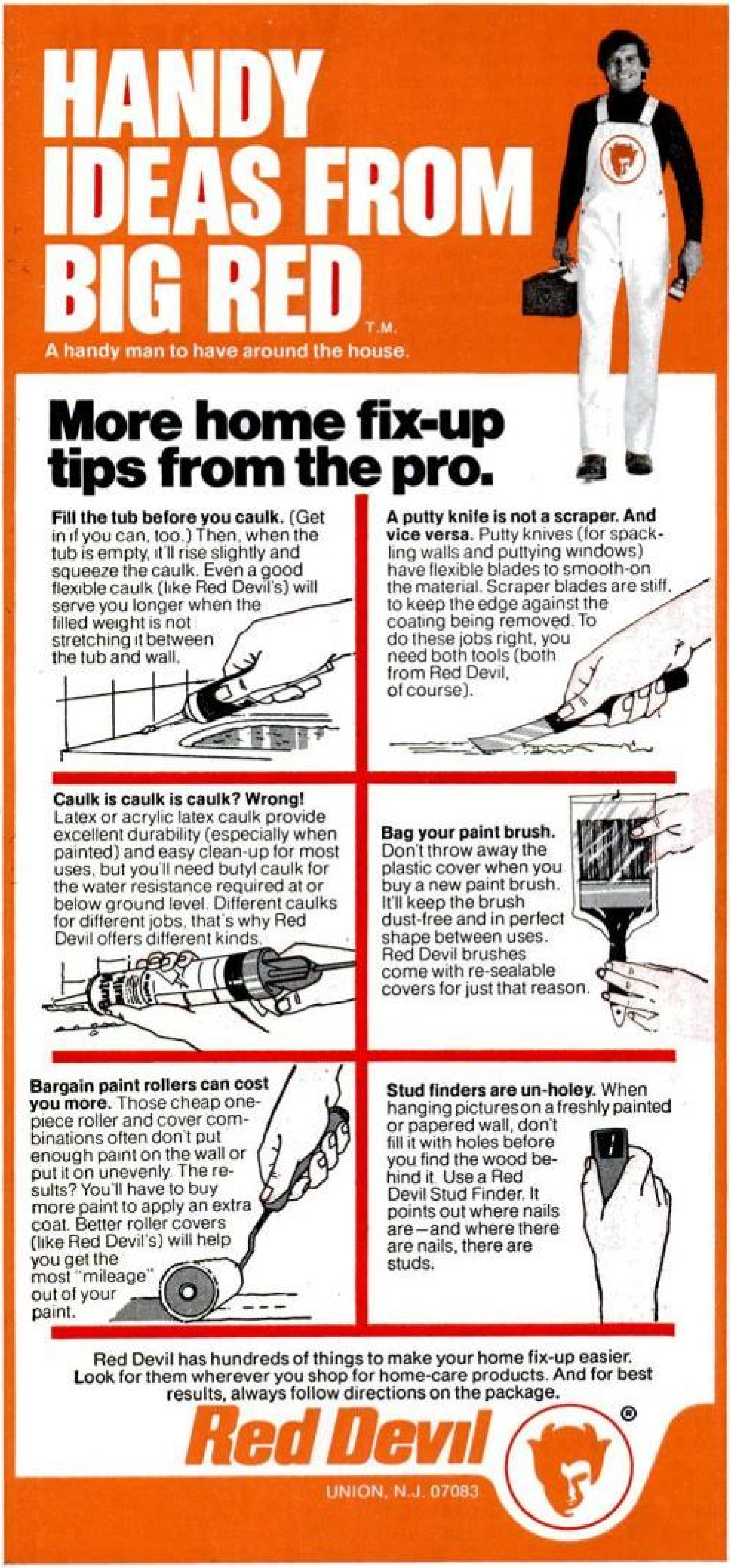

CORVETTE OWNERS REPORT

(Continued from page 191)

conditioning. It was often inoperable, or there were failures in the drive-belt system that also affected the alternator.

Next in the ranking were electrical troubles, at 16.2 percent. These included faults in the factory-installed burglar alarm system and in the stereo tape player, which was balky or developed an appetite for tapes. Prominent, too, were failures of the speedometer cable (13.1 percent), which assumed an almost ritual inevitability. In some cases a longer cable seemed to help the part live longer. Also mentioned were hassles with the carburetor and the transmission.

One nonmechanical problem area mentioned by several owners was the high cost of insuring the Corvette. One mentioned that GM's own insurance company wouldn't cover the Corvette—a surprising state of affairs. And a New York insurance office supervisor wrote, "I cannot afford to pay $1800 a year to insure this car and may have to sell it very soon." He had a manual four-speed, on which the rates are higher than with an automatic transmission.

Buy another?

The Corvette's ruggedness helped that owner live to buy another one. That's an ambition shared by 75.7 percent of the owners we heard from, an impressively high percentage expressing an intention to buy yet another Vette. They also put in bids for the changes they'd like. On the body materials, their views were in conflict. Many said they'd only buy another Corvette if they remained fiberglass-skinned, while 14.4 percent said they'd like to see a change to a metal body.

Specific requests for the future were put in by some owners. An Illinois cost and budget manager asked for "larger gas tank and a better-designed console area, perhaps providing a glovebox." He'll find much to like in the 1978 model. The many owners who said they'd like to see a hatchback coupe offered won't be entirely satisfied by the fastback 1978 design, which has no external luggage access, but they'll be pleased by its more practical storage space.

As we mentioned, Chevrolet has been running its own opinion surveys on the Corvette, and, what's more, has been acting on the results. If the St. Louis assemblers and painters can be given a chance to do their jobs, that can only lead to the best Corvettes ever in the years just ahead. ★★★

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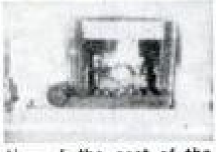

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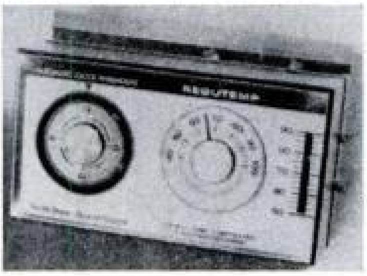

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IT'S NEW NOW

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Railroad car "cottages" make up units of a rail junction motel in Somerville, Tex. It began with a box-car dorm, and now has 13 box cars with 23 rooms. Caboose is the recreation hall.

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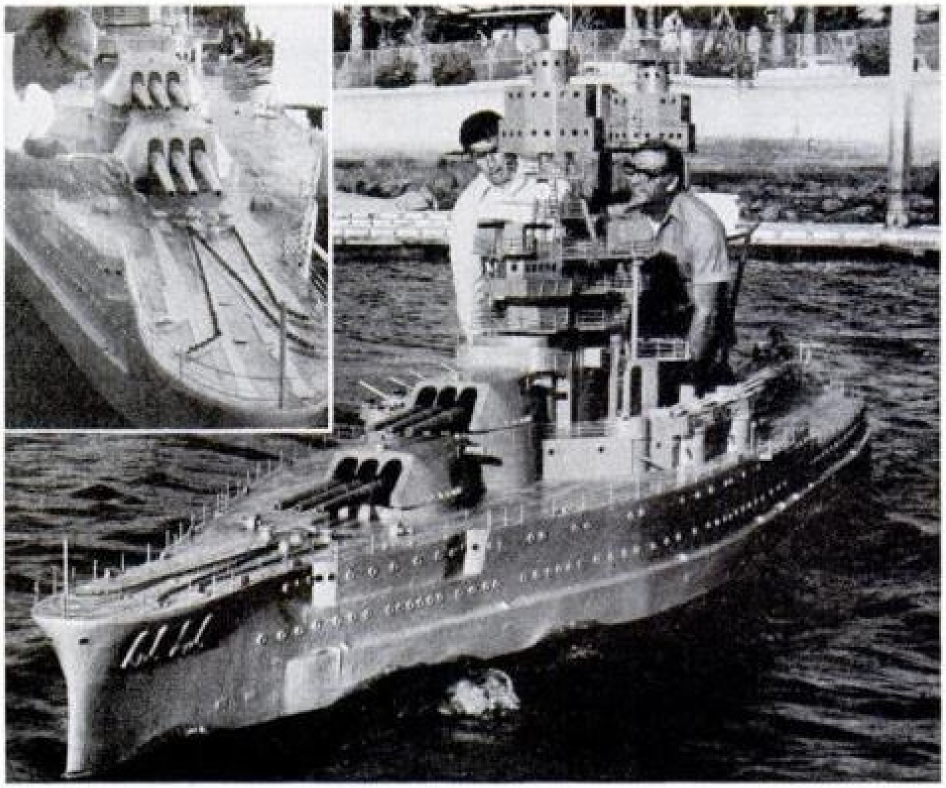
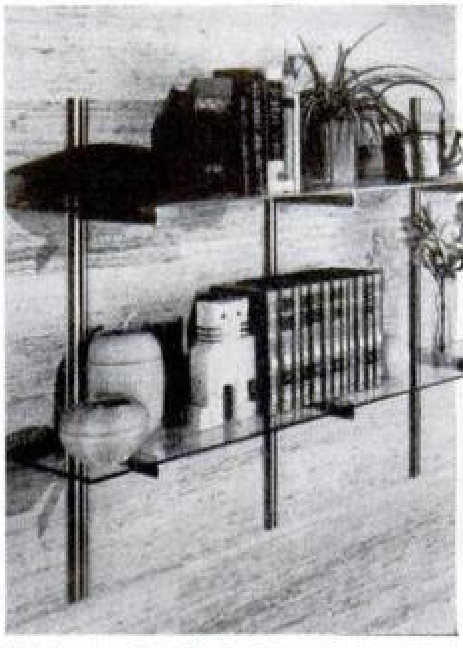
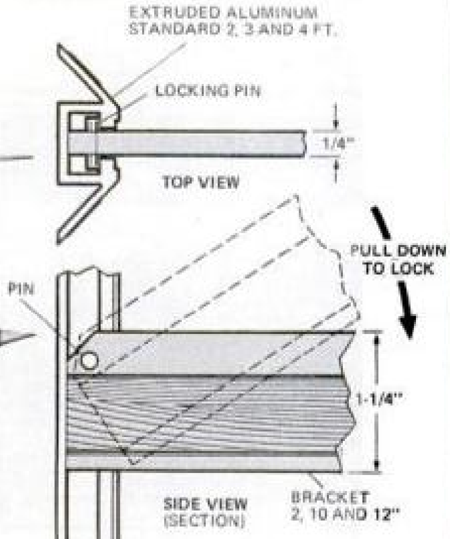


Outboard battleship

The U.S.S. Arizona in 1/25th scale comes to a 27-foot, 1000-lb. craft of fiberglass, polyester, wood and PVC pipe, built in three months from photos. Model, propelled by an outboard, is destined for parades before berthing at Pearl Harbor.





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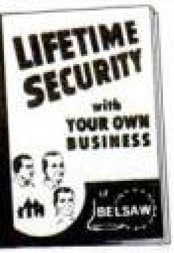

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YOUR COOLING SYSTEM

(Continued from page 108)

pump handle until the dial indicator on the gauge records the rated pressure. Don't go beyond that rating: excessive pressure can cause a cooling-system component to burst.

One of the following conditions will occur:

■ The dial indicator will hold steady for at least two minutes, indicating no serious leaks.

■ The dial indicator will drop slowly, indicating existence of a small leak. Check radiator, radiator drain cock, hoses, water-pump housing, thermostat housing, gasket and engine core (freeze) plugs. Replace a defective hose, gasket, radiator drain cock or core plug (see below). Add a good-quality leak stop to the coolant in an effort to end a radiator leak. Leaks from the water pump (*not light seepage* from the water-pump vent hole) indicate the pump should be overhauled.

■ The dial indicator will drop quickly, indicating a major leak. Replace a leaking part. A large radiator leak may possibly be repaired by a professional shop.

If the dial indicator drops but no leak can be found, the leak may be internal. Remove the pressure tester and install the pressure cap.

Start and run the engine. Pull the oil dipstick and look for water globules. Also check the automatic transmission dipstick for water, indicating that the transmission oil cooler has sprung a leak.

Replacing a core plug

Core plugs are located on both sides of the engine. Also called freeze or expansion plugs, they are soft metal plugs that are designed to "give" if coolant freezes, preventing expanding fluid from damaging the block.

When core plugs corrode, small coolant leaks develop. Replacing a plug may be done by drilling a hole in its center and prying the plug out with a screwdriver. A new plug can then be pressed into place.

High-temperature controls

Don't take it for granted that an engine is supposed to overheat at idle under very high temperature conditions. Many late-model engines possess a control that automatically provides extra cooling effect to prevent overheating.

Some call this the thermostatic vacuum switch; others the vacuum bypass valve; still others the thermal ignition control valve. Whatever, just keep it in mind that if your engine overheats at idle only under

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extreme temperature, replacing the valve may solve the problem.

Also remember that if overheating occurs only when you are driving at higher speeds the fault may lie with a weak spring in the lower radiator hose which is collapsing under pressure. There's no way to test this, but replacing the hose may be worth a shot.

Cooling system maintenance

You can keep a cooling system sound for many years by performing the following preventive maintenance program whenever your car registers another 24,000 miles:

- Inspect radiator and heater hoses.
- Inspect and readjust drive belts.
- Clean debris from radiator fins.
- Test the radiator pressure cap.
- Test the thermostat.
- Drain and clean the cooling system with a commercially available chemical solution.
- Fill the system with a fresh solution of high-grade ethylene glycol.

Noncooling system overheating

Malfunctions that can cause engine overheating other than a defective cooling system are improper ignition timing, blown head gasket, incorrect valve timing, blocked exhaust system and a jammed manifold heat-control valve.

About air-cooled engines

Not every car uses liquid coolant. Some, notably Chevrolet Corvair and Volkswagen Beetle, uses air to cool the engine.

Engines cooled by air alone are confined to a particular configuration. Typically, they are horizontally opposed and surrounded by a plenum chamber making air pressure inside greater than the outside.

A blower delivers cooling air to cylinders and heads, expelling heat through openings in the engine. The degree of cooling is normally regulated by a thermostat in the plenum which opens and closes a valve on the blower air intake.

Air-cooled engines will overheat when one of the following malfunctions takes place:

- Loose, worn or slick blower belt.
- Stuck thermostat.
- Misadjusted air intake valve.
- Clogged engine cooling fins.
- Loose engine shroud.
- Dirty oil cooler.
- Incorrect ignition or valve timing.
- Dragging brakes.
- Defective ignition system.
- Incorrect grade and viscosity oil.
- Improperly adjusted valves. ★★★

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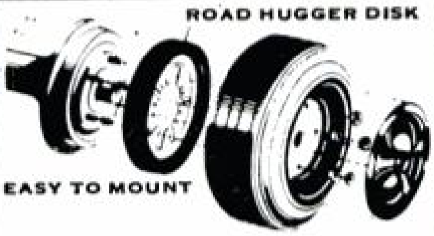

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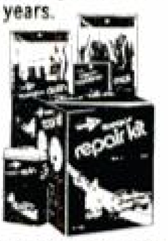

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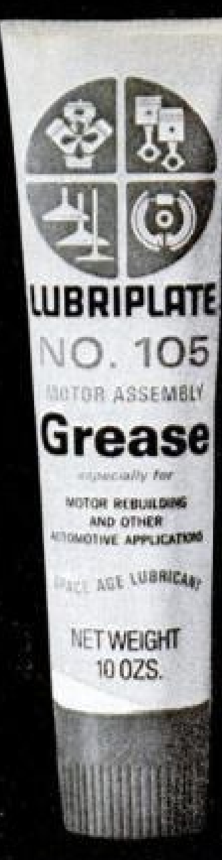

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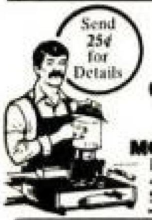

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FIGHTING HIGH-RISE FIRES

(Continued from page 71)

be far off when engineers will no more think of omitting vital fire-management systems than they would airconditioning. Continuing research conducted at universities, government labs, the National Fire Protection Assn. and other agencies is supplying the answers—and now they're beginning to be applied.

One of the most advanced concepts in modern fire control is the positive-negative pressure principle. By controlling the airflow in inlet and outlet ducts, the fire area can be depressurized to vent heat and smoke to the outside, while other areas are pressurized to prevent the spread of smoke and flame. Fire-stopping dampers are installed in ductwork and other openings between walls and floors.

Many newer buildings use "compartmentation"—a system of firewalls to break up open spaces and act as fire barriers—just as watertight compartments in a ship are designed to prevent a sinking if one area should be damaged. Such fire-blocking compartments also help to provide safe areas or "sanctuaries" where office workers can ride out a fire without harm.

Standby diesel generators are ready to supply emergency power and lighting should fire knock out regular power. Internal "wet" standpipes, kept under high pressure by powerful pumps, carry water to the tallest parts of a skyscraper, with hose outlets at closely spaced locations on all floors.

One clever new development is the use of portable telephones carried by firemen in some cities. The phones plug into wall jacks to keep the men in constant touch with fire officers in the building's operations center. What's neat about the jack system is that it eliminates the need for installing permanent emergency phones that are subject to damage through vandalism or misuse by unauthorized persons.

Fireman also carry walkie-talkie radios for backup communication where there are no phones or phone lines are knocked out.

Return of the sprinkler

Those ancient ceiling sprinklers you used to see in old buildings are making a dramatic comeback as fire-prevention engineers are rediscovering their virtues. The big advantage of sprinklers—activated by excessive heat—is that they start fighting a blaze immediately without waiting for firefighters to arrive. While they may not completely put out a fire by

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emselves, their main value is that ey cool it down and help to keep under control until firemen can get ere.

Not everyone agrees on the need or sprinklers, however—they are dmittedly costly to install, are not onsidered aesthetically attractive in modern building and have been nown occasionally to go off falsely, renching everything and everybody ith predictably unhappy results. till, proponents of sprinklers argue hat their advantages outweigh any rawbacks. Sprinklers, they point ut, are not subject to traffic jams hat may delay firemen, and they on't panic like people. National ureau of Standards engineer Gregry Harrison says that sprinklers educe the life risk in high-rise tructures to "near zero." Richard land, chairman of the National ommission on Fire Prevention and ontrol, adds that, without automatic uppression such as supplied by a prinkler system, a serious skycraper ire can quickly become a violent unaway. "Mobile fire services cannot be expected to do much about a ire of this kind without having builtn extinguishing equipment," he aserts.

One strong argument in favor of prinklers is that, according to nown public records, there apparntly has never been a fatality in he United States in a fully sprinlered office building.

Proof that systems work

One example of a modern skycraper that has successfully proven he value of sophisticated fire-safety ystem is New York City's mammoth 10-story twin-towered World Trade Center. Just within the past year the uilding has experienced several poentially dangerous fires, one threatening patrons in the posh scenic-view estaurant at the very top of the tructure. In every case, the fire was contained and quickly extinuished by city firefighters without njuries or panic.

New federal office buildings in Seattle, Atlanta and Portland, Ore., re models of high-rise structures ontaining the latest in fire-control ystems. The General Services Administration, responsible for the deign and operation of such buildings, as led a crusade to promote fire afety in both governmental and ommercial high-rise—and its efforts re paying off. Other notable strucures incorporating modern safety eatures are the Fiduciary Trust

(Please turn to page 200)

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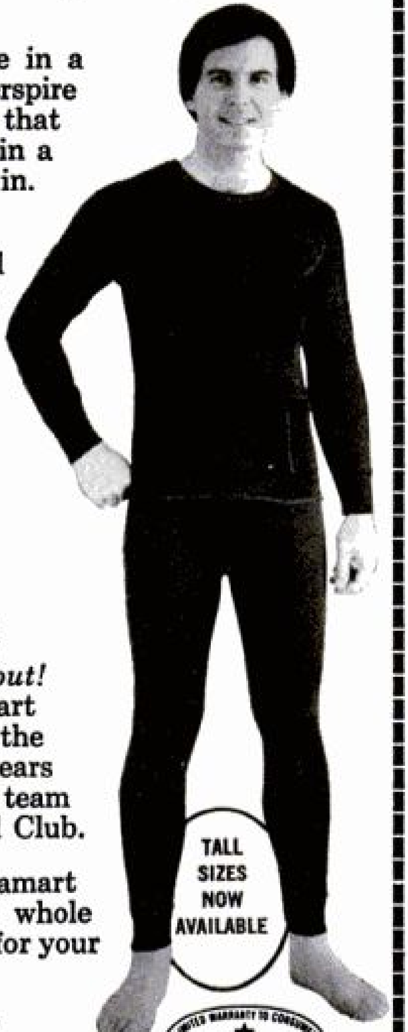

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FIGHTING HIGH-RISE FIRES

(Continued from page 199)

Building in Boston, New York City's One Bankers Trust Plaza, the Security Pacific Bank Tower in Los Angeles, the pyramidal Transamerican Building in San Francisco and the Sears Tower in Chicago—at 114 stories, the tallest skyscraper in the world.

Newer, even more advanced fire-suppression systems are also under study. One possibility is the use of Halon, an inert gas that smothers fire and in low concentrations is not harmful to humans. The advantage of a gas like Halon is that it could be dispersed quickly through a fire area and would seep into and under places that normally block water spray from overhead sprinklers, such as desks, tables, closets and the like. But Halon is expensive and requires more complex storage and dispensing equipment than sprinkler systems so there is little likelihood that it will see widespread use within the immediate future.

Retrofitting existing buildings

One of the biggest problems concerning fire safety is not so much with new high-rise going up but with existing structures. There are more than 50,000 buildings above seven stories high in the United States alone. According to GSA administrator Arthur Sampson, many of these tall structures, considered from a fire-safety standpoint, are "simply not adequate."

Retrofitting existing buildings with modern fire-control systems is unquestionably costly and complicated, especially the installation of elaborate plumbing networks required for sprinklers. There are, however, some aids that can be added fairly easily—vital early-warning smoke detectors, automatic fire-department call-up, elevator capture and emergency communications. Air-handling systems can sometimes be reworked to exhaust heat and smoke. Some permanent partitions can be put up to provide compartmentation. Limits can be placed on the amount and type of flammable materials allowed in offices.

Unfortunately, it too often takes a tragedy to provide the push for progress. Sprinklers were installed in the Pioneer Hotel in downtown Tucson—*after* a savage fire swept the building in 1970, killing 28. Hopefully, we will not wait for similar disasters to strike before taking the necessary steps to stop killer fires. Or one day a *Towering Inferno* story may be written in reality, not just a movie script. ★★★

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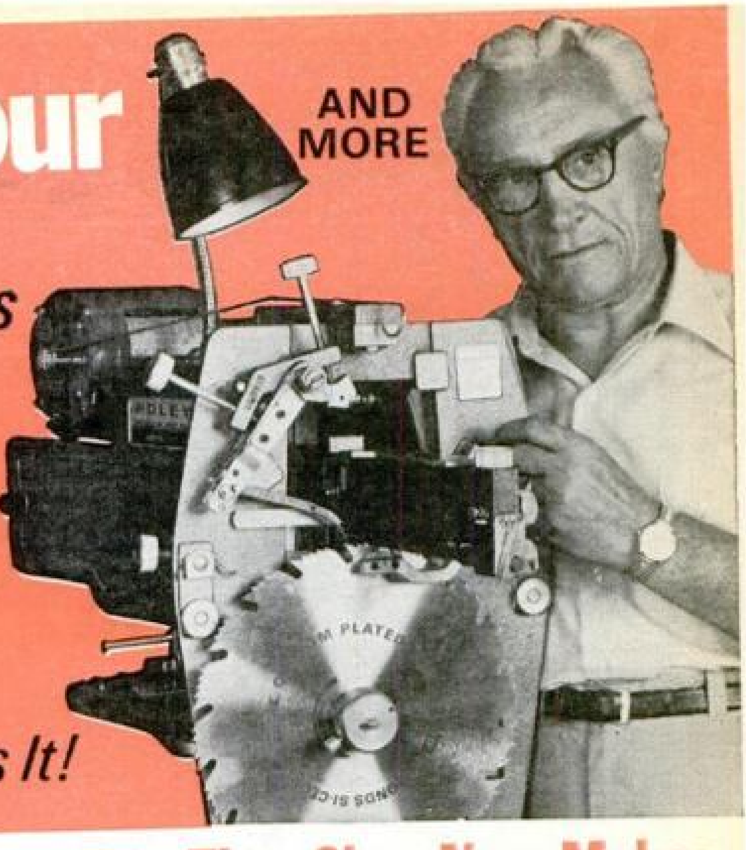

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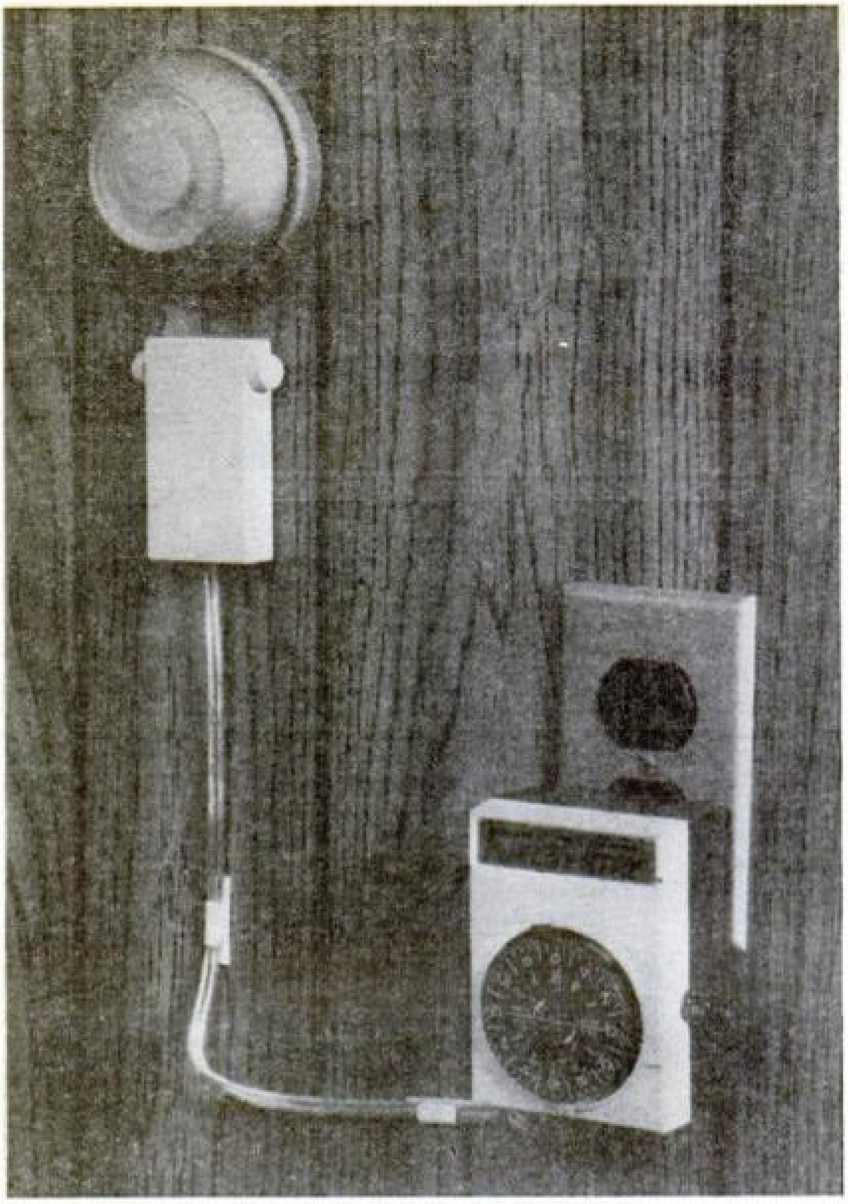

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DRIVING THE MERCEDES-BENZ 6.9

(Continued from page 83)

tweaks the antisquat characteristics of the 450 SEL when they turn it into a 6.9 (the antidive setup of the 450 suspension, however, is adequate for the 6.9 as well). A Watts linkage at the rear is the tweak that minimizes squat on acceleration. It's just a matter of housing each rear wheel bearing in a vertical carrier positioned between the semitrailing arm and rear stabilizer bar. Their relative positions act to squash the squat.

With 250 hp at 4000 rpm and 360 ft.-lb. of torque at only 2500 rpm, two-ton flagship of the Mercedes line easily burns rubber, hits 130 mph while handling superbly.

The chock-full-of-nitrogen heavenly ride is one feature that distinguishes the $38,000 6.9 from the $25,000 450 SEL. See, for the $13,000 difference you don't just get the bigger engine, although it was the monster, muscle-car power-plant (that has been available in Europe) that led to the outcry from prospective buyers here. Popular demand brought this flagship of the Mercedes line to America. So many people went to dealers with money in hand that M-B of North America felt obliged to deliver, and it will—about 500 a year.

That powerful 6.9-liter V8 does have some nice time and money-saving features. Since the capacity of the dry-sump lube system is a sloshing 12.7 quarts, you need to change oil only every 12,500 miles or once a year. Part of the reason for the high oil capacity is the degree of oil flow needed by the built-in brain that automatically adjusts valve clearance: It's hydraulic. Also designed to cut your garage time are hands-off designs like the constant-flow fuel injection, breakerless ignition and ferrolastic head gaskets (on all M-B engines now) that don't require retorquing.

The 6.9 is without question an engineering tour de force and a silky smooth car. And there's enough reliability and extended service intervals designed into it so you can (at least while the car is new) knock off being a mechanic on Saturday and study the mechanics of hydraulic and pneumatic systems. ★★★

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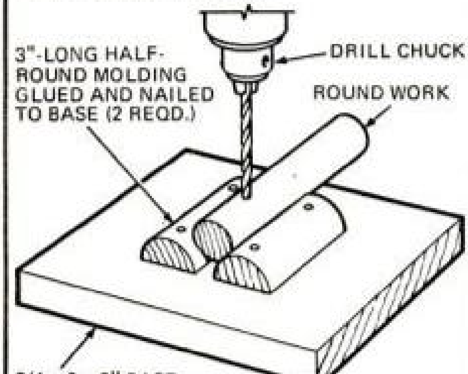
HINTS FROM READERS

Time-saving brush holder

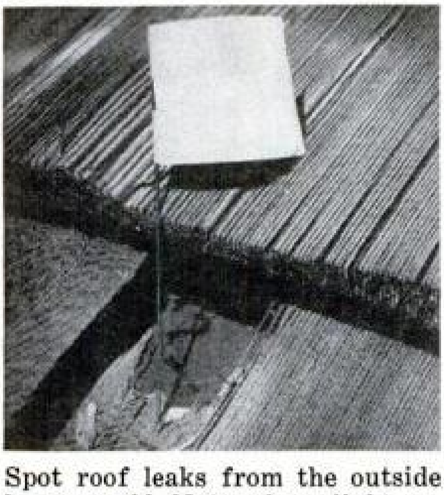
Make a permanent cleaning receptacle for a frequently used brush. Chisel a hole in the jar lid and secure the brush with auto body filler. Put solvent in the jar and store the brush.—*Ken Wells*

V-block substitute



This V-block substitute holds round work in place to bore holes. Secure two lengths of half-round stock to a base. Clamp this to the drill table.—*Howard Moody*

Roof hole marker



Spot roof leaks from the outside by yourself. Note where light enters the attic other than at the joints. Tape a flag to a length of wire, roll the flag around it and push through hole.—*Parry Yob*

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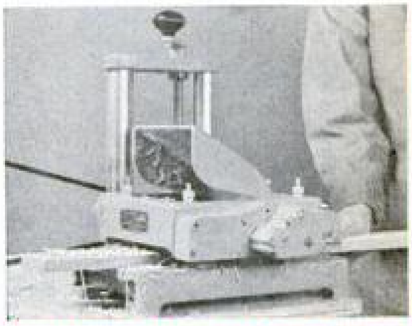

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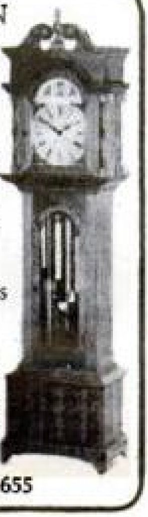

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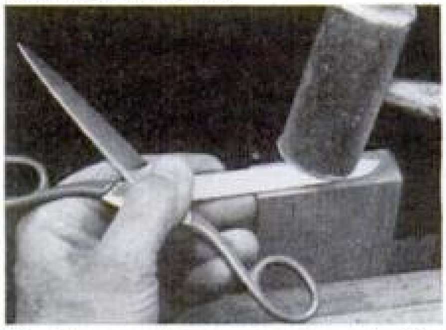
HINTS FROM READERS

Foil shields clamps

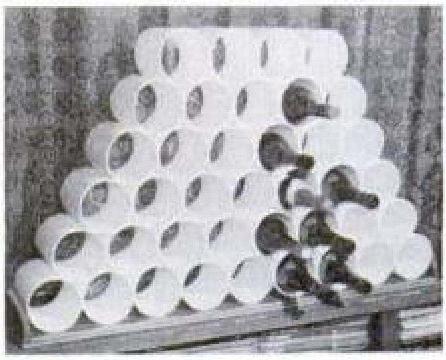
To avoid attaching the securing clamps directly to parts being soldered, cover the jaws with two or three thicknesses of aluminum foil. Works great.—*Tom Johnson*

Setting scissors



If sharp scissors won't cut, the blades could need "setting" to increase pressure against each other. Place each blade in turn on a block of secured wood. With a mallet firmly tap the inside of each blade. Begin above the point; tap upward 1 in.—*Ken Wells*

Wine rack from plastic pipe



To make a wine rack, cut 4-in.-dia. PVC or styrene pipe (available at building supply dealers) in 5¾-in. sections and cement them together. To cut, feed the pipe slowly into a table saw, rotating it as you work. Use cement formulated for the type of pipe you have. Attach the rack to a base if you wish.—*L.R. Luttrell*

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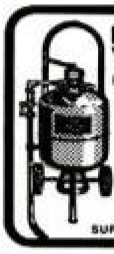

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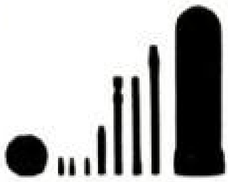

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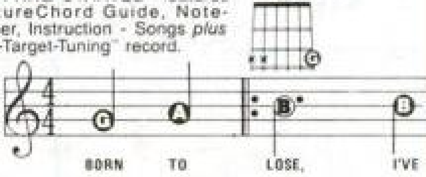

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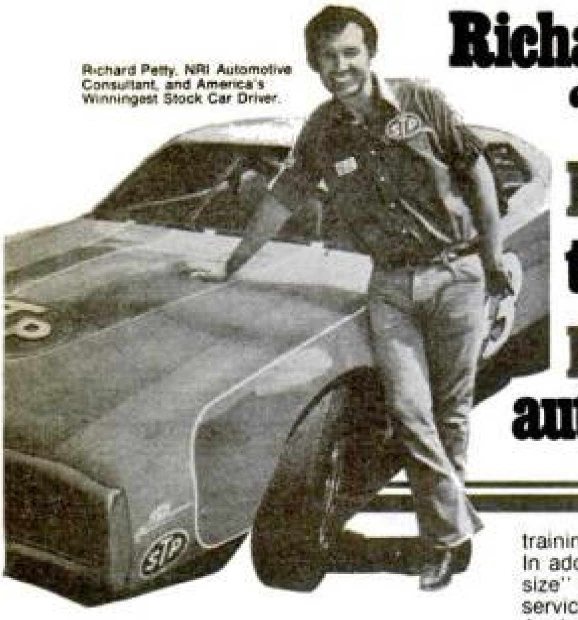

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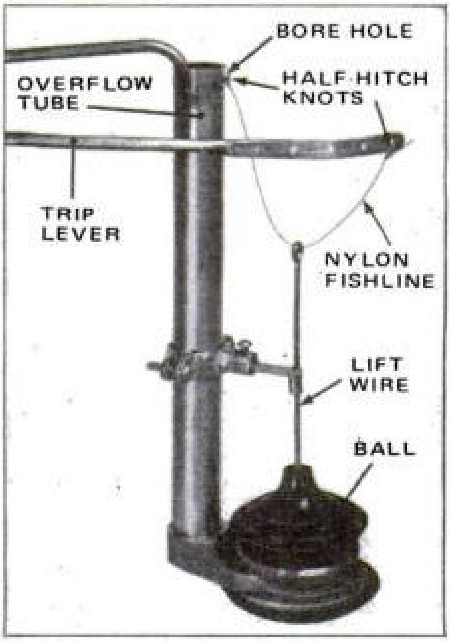

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A few flushings will show you how long to make the cord. Be sure the lift-wire ring is fully closed so the line won't jam in the crack.—Jorma Hyypia

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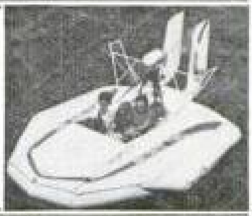

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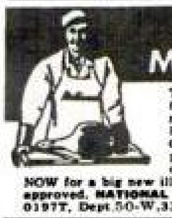

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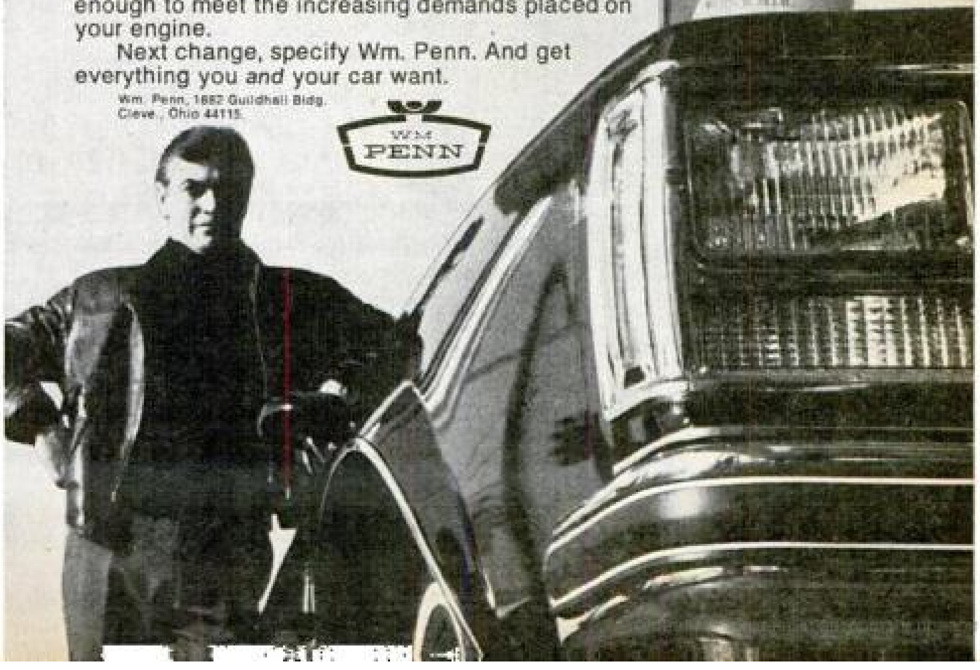

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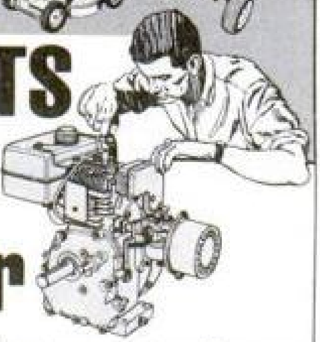

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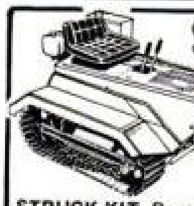

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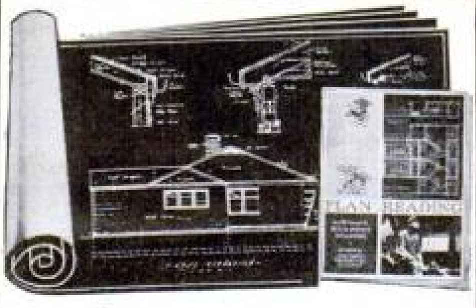

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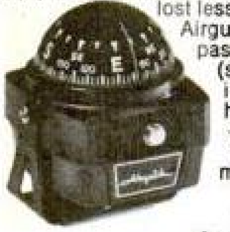

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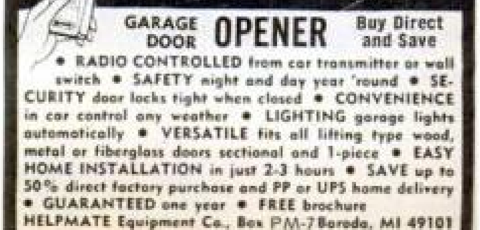

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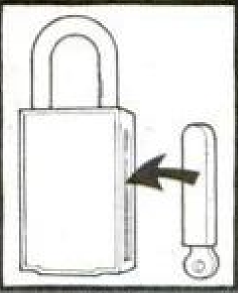

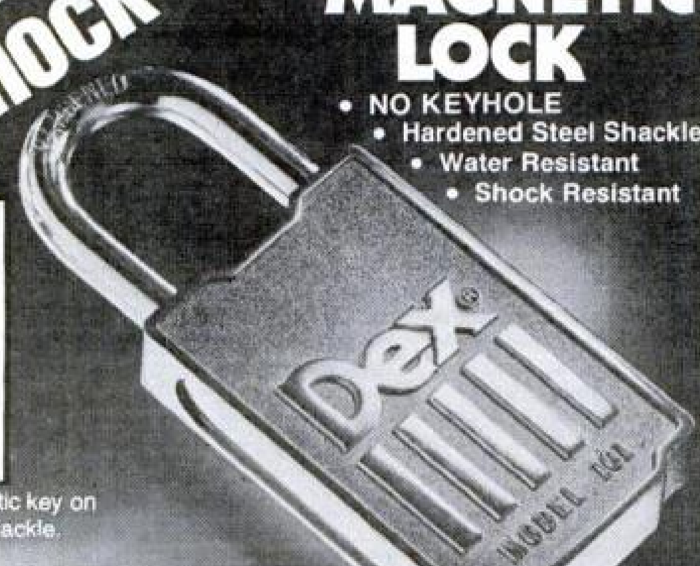

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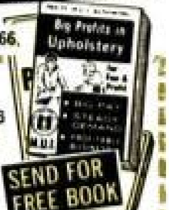

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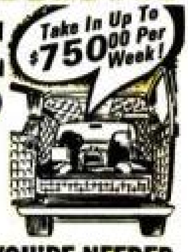

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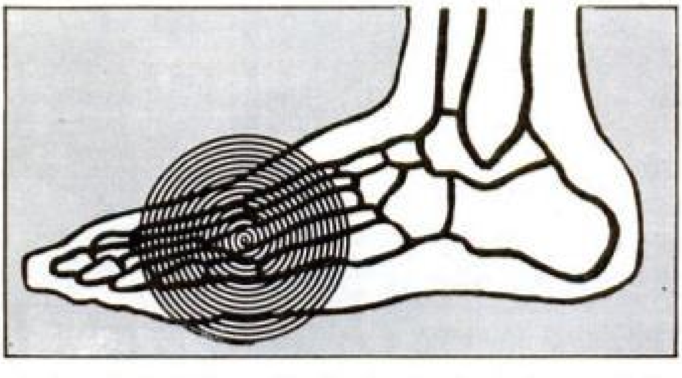
My Feet Were Killing Me...Until I Discovered the Miracle of Hamburg!



It was the European trip I had always dreamed about. I had the time and money to go where I wanted—see what I wanted. But I soon learned that money and time don't mean much when your feet hurt too much to walk. After a few days of sightseeing my feet were killing me.

Oh, I tried to keep going. In Paris I limped through Notre Dame and along the Champs-Elysées. And I went up in the Eiffel Tower although I can't honestly say I remember the view. My feet were so tired and sore my whole body ached. While everybody else was having a great time, I was in my hotel room. I didn't even feel like sitting in a sidewalk cafe.

The whole trip was like that until I got to Hamburg, Germany. There, by accident, I happened to hear about an *exciting breakthrough for anyone who suffers from sore, aching feet and legs.*

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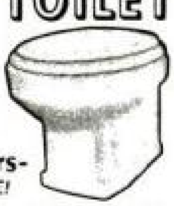

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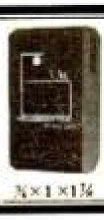

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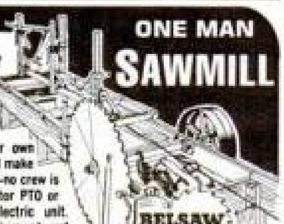

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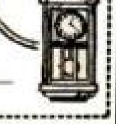

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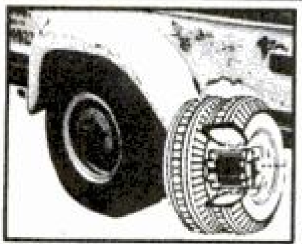

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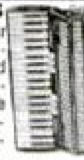

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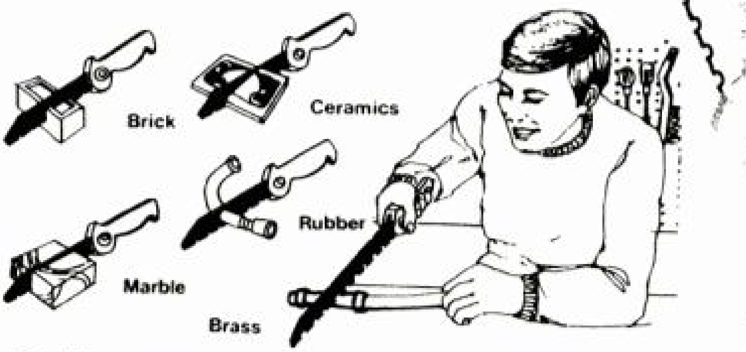

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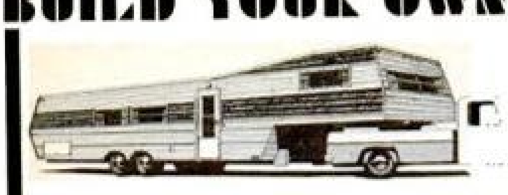

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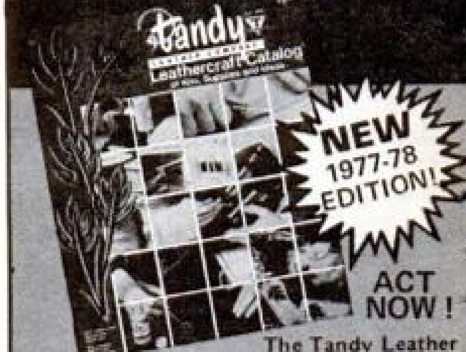

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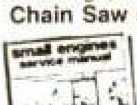

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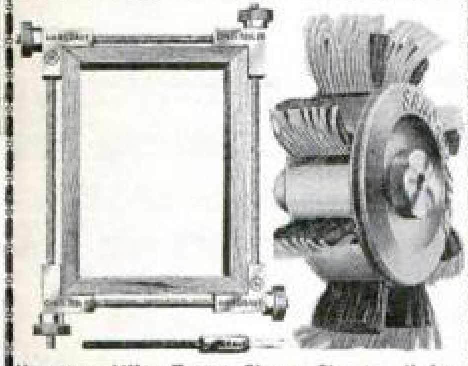

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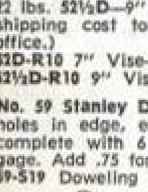

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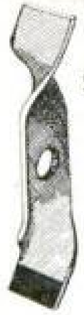

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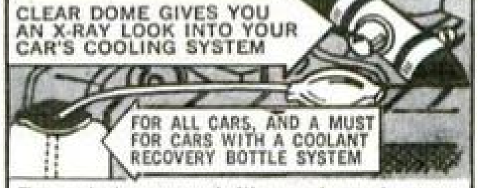

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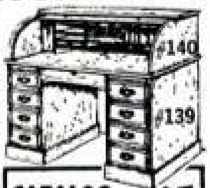

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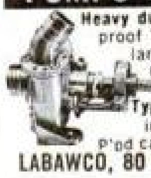

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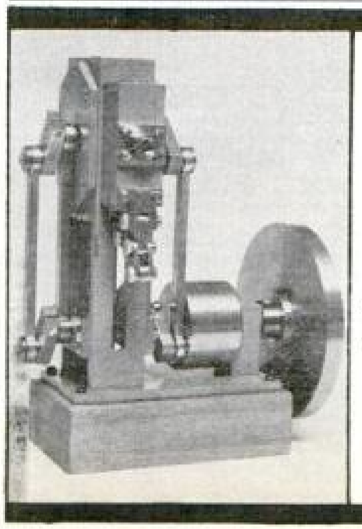

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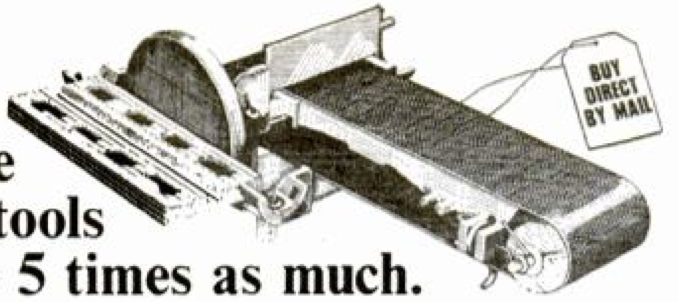

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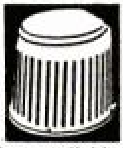

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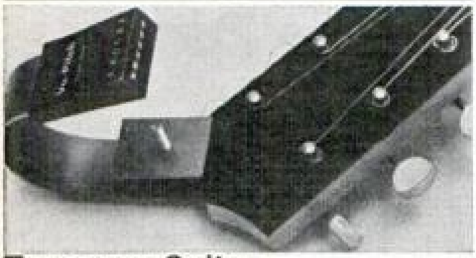

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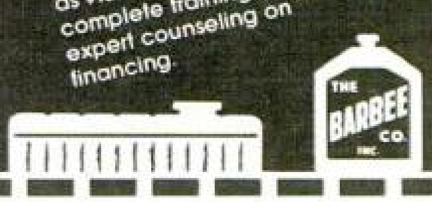

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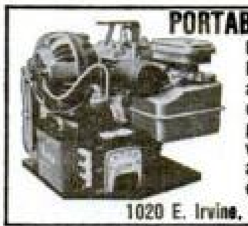

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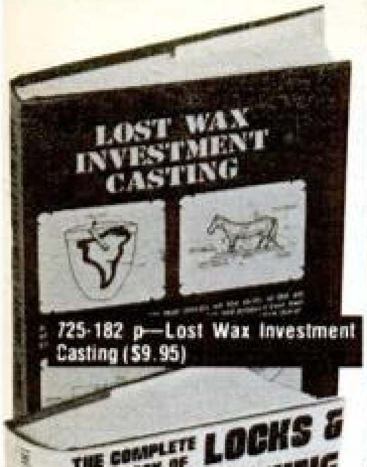

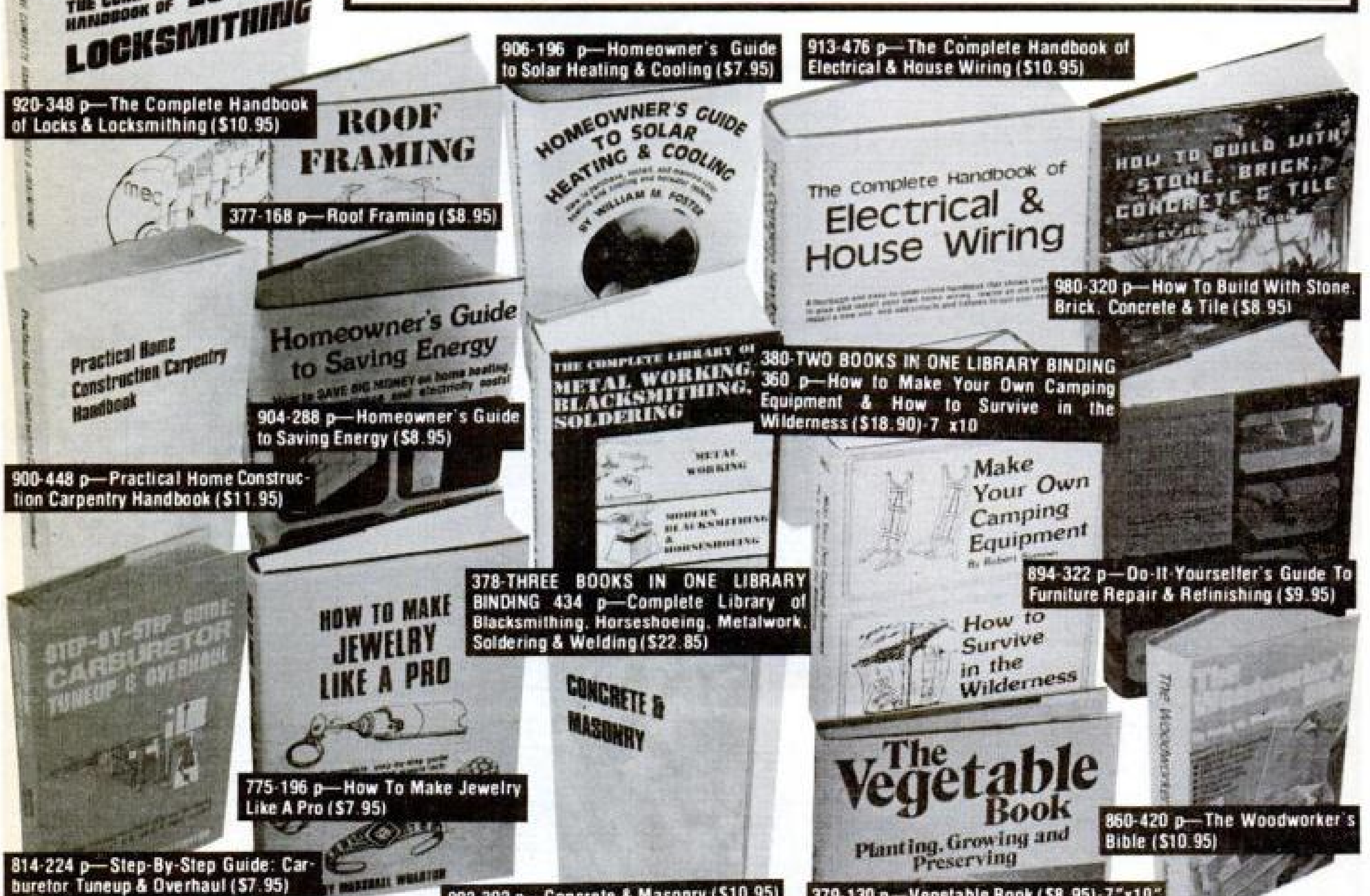

Facts About Club Membership

● The 6 introductory books of your choice carry publisher's retail prices of up to $86.55. They are yours for only 99¢ for all six (plus postage and handling) with your Trial Membership ● You will receive the Club News, describing the current selection, alternates and other offerings every 4 weeks (13 times a year). ● If you want the selection, do nothing: it will be sent to you automatically. If you do not wish to receive the selection, or if you want to order one of the many alternates offered, you simply give instructions on the reply form (and in the envelope) provided, and return it to us by the date specified. This date allows you at least 10 days in which to return the form. If, because of late mail delivery of the Club News, you do not have 10 days to make a decision and so receive an unwanted selection, you may return it at Club expense. ● To complete your Trial Membership, you need buy only four additional monthly selections or alternates during the next 12 months. You may cancel your Membership any time after you purchase these four books. ● All books—including the Introductory Offer—are fully returnable after 10 days if you're not completely satisfied. ● All books are offered at low Member prices plus a small postage and handling charge. ● **Continuing Bonus:** If you continue after this Trial Membership, you will earn a Dividend Certificate for every book you purchase. Three Certificates, plus payment of the nominal sum of $1.99, will entitle you to a valuable Book Dividend of your choice which you may choose from a special list provided Members.

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Give or take an XX or two.

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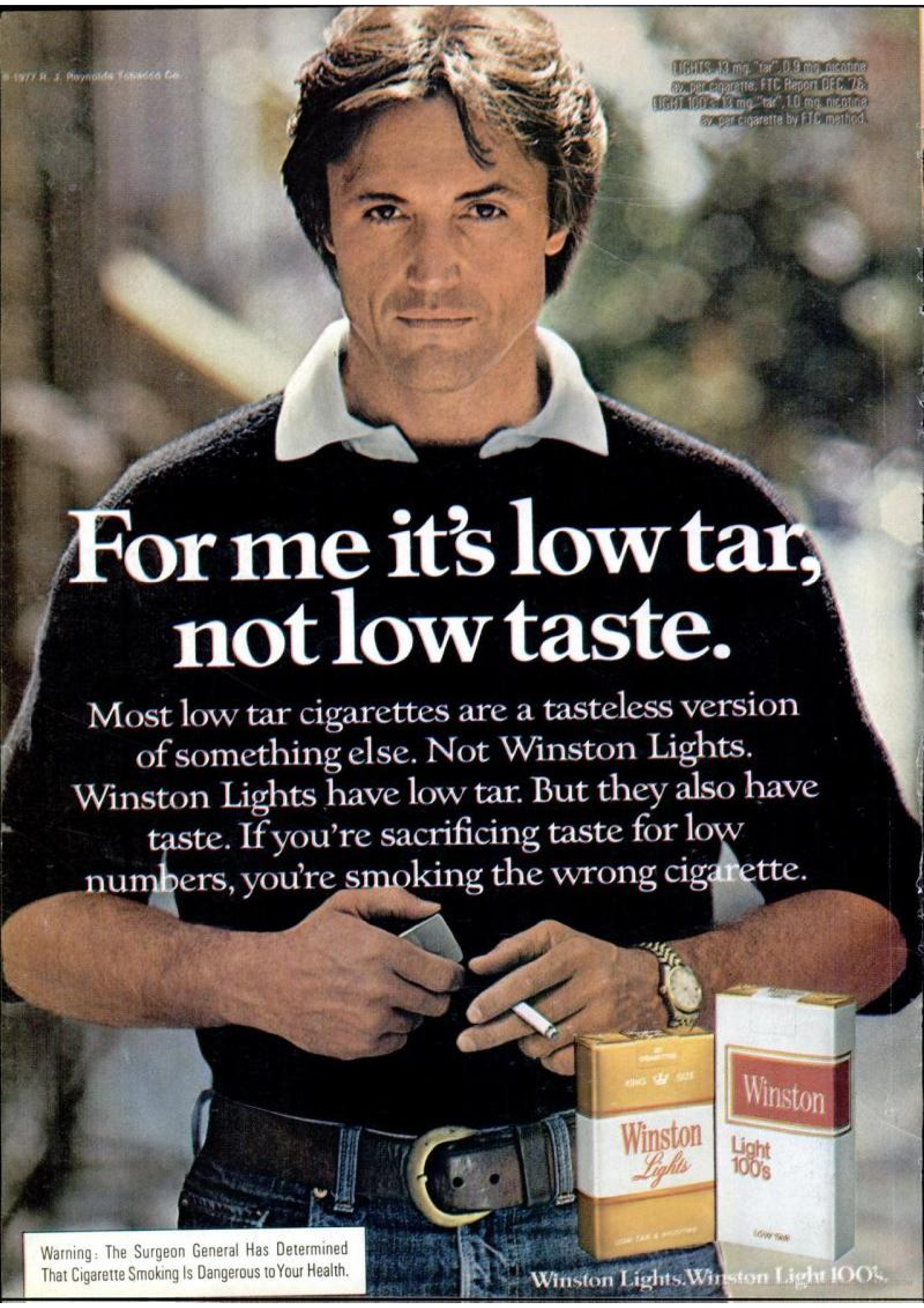
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